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ggtgatacttctacaatcagaagtcaagggaaggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggctatttctgtgcaagagtggtgtactatagtaactcttactgggtactcagatgtctggggcac
agggaccacggtcaccgtctcttctgatcaatccaactctgaagaagcaaagaaaggaggagccaaaaaggaggaagccaaga
aatctaacagcgtcgacattgttctgactcagctccagccaccctgtctgtgactccaggagatagagtctcttctcctgcaggggcc
5 agccagagtattagcgactacttacactgggtatcaaaaaatcacatgagcttccaaggcttctcatcaaatatgcttccattccatc
tctgggatccctccagggtcagtgaggcagtgaggatcagggtcagatttactctcagtatcaacagtgtggaacctgaagatgttgaa
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caggatctcctgcaaggcttctgggtatgccttcacaactactggaatgcagtggtgcaagagatgccaggaaagggttgagt
10 ggattggctggataaacaccccactctggagtgcacaaatgtagaagacttcaaggacggttgccttctcttggaaacctctgc
caacactgcatatttacagataagcaacctcaagatgaggacacggctacgtatttctgtgtgagatccgggaatgttaactatga
cctggcctactttgcttactggggccaaggacactggcactgtctctgatcaggagcccaaatctctgacaaaactcacacatcc
ccaccgtccccagcacctgaactcctggggggatcgtcttctcttcccccaaaacccaaggacacctcatgatctcccg
gacccctgaggtcacatgcgtgggtgggtgacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtgga
15 ggtgcataatgccaagacaaagccgcgggaggagcagtlacaacagcacgtaccgtgtggtcagcgtctcaccgtcctgcacca
ggactggctgaatggcaaggagtacaagtgaaggcttccaacaagccctcccagccccatcgagaaaacaatctccaaagc
caaagggcagccccgagaaccacaggtgtacacctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacct
gcctgggtcaaaggcttctatcccagcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacg
cctcccgtgctggactccgacggctcttctctctacagcaagctcaccgtggacaagagcaggtggcagcagggggaagctct
20 tctcatgctccgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatclaga

2H7-antiCD40 scFv MTH (SSS) MTCH2WTCH3 (2H7-40.2.220Ig) (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSFLLISASVIIARGQIVLSQSPAILSPGGEKVTMTCRASSSVSYMHWY
25 QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKGGGGSGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYSNSYWFYFDVWGTGTTVTVSSDQSNSEEAK
KEEAKKEEAKSNSVDIVLTQSPATLSVTPGDRVSLSCRASQSISDYLHWYQQKSH
30 ESPRLLIKYASHSISGIPSRFSGSGSGSDFTLINSVEPEDVGIYYCQHGHSPFWTFGG
GTKLEIKRGGGGSGGGSGGGGSIQLVQSGPELKKPGETVRISCKASGYAFTTTG
MQWVQEMPQGLKWKWINTPLWSAKICRRLQGRFAFSLETSANTAYLQISNLKD

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EDTATYFCVRSGNGNYDLAYFAYWGQGLVTVSDQEPKSSDKTHTSPSPAPPELL
GGSSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPRE
PQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPVLDS
5 GSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

5B9 VH (includes the VH leader peptide) (nucleotide sequence) (SEQ ID NO: __)

atggctgtcttggggctgctcttgcctggtagacattccaagctgtgcctatcccaggtgcagctgaagcagtcaggacctggcc
tagtgacgtcctcacagagcctgtccatcacctgcacagtctctggtttcattactacattgctgtacactgggttcgccagtctc
10 caggaaagggctctggagtggtgggagtgatggagtggtggaatcacagactataatgcagctttcatatccagactgagcatc
accaaggacgattccaagagccaagtttctttaaataaacagctctgcaacctaatgacacagccatttattactgtgccagaaatg
ggggtgataactacccttattactatgctatggactactgggggtcaaggaacctcagtcaccgtctcctca

5B9 VH (minus the leader) (nucleotide sequence) (SEQ ID NO: __)

15 cagggtgcagctgaagcagtcaggacctggcctagtgacgtcctcacagagcctgtccatcacctgcacagtctctggtttcattactac
ctacattgctgtacactgggttcgccagctccaggaaagggctctggagtggtgggagtgatggagtggtggaatcacaga
ctataatgcagctttcatatccagactgagcatcaccaaggacgattccaagagccaagtttctttaaataaacagctctgcaacctta
atgacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatggactactggggicaaggaacctca
gtcaccgtctcctca

20

5B9 VH (includes leader peptide) (amino acid sequence) (SEQ ID NO: __)

MAVLGLLFCLVTFPSCVLSQVQLKQSGPGLVQSSQSLSTCTVSGFSLTTYAVHWV
RQSPGKGLEWLGVIWSSGITDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDAIY
YCARNGGDNYPYYYAMDYWGQGTSVTVSS

25

5B9 VH (no leader peptide) (amino acid sequence) (SEQ ID NO: __)

QVQLKQSGPGLVQSSQSLSTCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSSGI
TDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDAIYYCARNGGDNYPYYYAMDY
WGQGTSVTVSS

30

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5B9 VL (nucleotide sequence) (SEQ ID NO: __)

atgaggttctctgctcagcttctggggctgcttgtgctctggatccctggatccactgcagatattgtgatgacgaggctgcattctc
caatccagtcactcttgaacatcagcttccatctctgcaggtctagtaagagtctcctacatagtaatggcatcactatttgattgg
tatctgcagaagccaggccagctctcctcagctcctgatttatcagatgtccaacctgcctcaggagtcccagacaggttcagtagca
5 gtgggtcaggaactgatttcacactgagaatcagcagagtggaggctgaggatgtgggtgtttattactgtgctcaaatctagaact
tccgctcacgttcggtgctgggaccaagctggagctgaaacgg

5B9 VL (amino acid sequence) (SEQ ID NO: __)

MRFSAQLLGLLVLPWPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHLSNGITY
10 LYWYLQKPGQSPQLLIYQMSNLASGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKR

5B9 scFv (nucleotide sequence) (SEQ ID NO: __)

aagcttccgccatgaggttctctgctcagcttctggggctgcttgtgctctggatccctggatccactgcagatattgtgatgacgca
15 ggctgcatttccaatccagtcactcttgaacatcagcttccatctctgcaggtctagtaagagtcctacatagtaatggcatca
cttatttgattggatctgcagaagccaggccagctctcctcagctcctgatttatcagatgtccaacctgcctcaggagtcccagaca
gggttcagtagcagtggggtcaggaactgatttcacactgagaatcagcagagtggaggctgaggatgtgggtgtttattactgtgctc
aaaatctagaacttccgctcacgttcggtgctgggaccaagctggagctgaaacggggtggcgtggctcgggcggtggtgggt
cgggtggcggcggtatgacaggtgcagctgaagcagtcaggacctggcctagtgcagtcctcacagacctgtccatcacct
20 gcacagctctctggtttctattaactacatgctgtacactgggttcgccagctctccaggaaagggtctggagtggctgggagtgat
atggagtgtggaatcacagactataatgcagctttcatatccagactgagcatcaccagacgattccaagaccaagttttctt
aaaatgaacagctcgaacctaatgacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatgga
ctactggggtcaaggaacctcagtcaccgtctcctct

25 5B9 scFv (amino acid sequence) (SEQ ID NO: __)

MRFSAQLLGLLVLPWPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHLSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGSGGGSGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSGITDYNAAFISRLSITKDDSK
30 SQVFFKMNSLQPNDAIYYCARNGDNYPYYAMDYWGQGTSVTVSS

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5B9 scFv-hmflgG1-hCD80 (nucleotide sequence) (SEQ ID NO: __)

aagcttcccgcacatgaggttctctgctcagcttctggggctgcttgctctggatccctggatccactgcagatattgtgatgacgca
ggctgcattctccaatccagtcactcttgaacatcagcttccatctcctgcaggctagtaagagtcctacatagtaatggcatca
5 cttatttgattggtatctgcagaagccaggccagctctcctcagctcctgatttatcagatgtccaacctgcctcaggagctccagaca
gggtcagtagcagtgggcaggaactgatttcacactgagaatcagcagagtgagggtgaggatgtgggtgtttattactgtgctc
aaaatctagaacttccgctcacgttcgggtgctgggaccaagctggagctgaaacgggggtggcgggtggctcgggcgggtgggtgggt
cgggtggcggcgatgctcacagggtgcagctgaagcagtcaggacctggcctagtgcagtcctcacagagcctgtccatcacct
gcacagctctggtttctcattaactacctatgctgtacactgggttcgccagctcctcaggaaagggtctggagtggtgggagtgat
10 atggagtggtggaatcacagactataatgcagcttccatccagactgagcatcaccaaggacgattccaagagccaagtttcttt
aaaatgaacagtctgcaacctaatgacacagccatttattactgtgccagaatgggggtgataactacccttattactatgctatgga
ctactgggtgcaaggaacctcagtcaccgtctcctctgatctggagcccaatctctgacaaaactcacacaagcccaccgagcc
cagcacctgaactcctggggggatgctcagctctcctctccccccaaaacccaaggacacctcatgatctcccgaccctgag
gtcacatgcgtggtgggtggacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataat
15 gccaaagacaagccgcgggaggagcagtaaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccaggactgggt
gaatggcaaggagtaagaagtgaaggtctccaacaaagccctccagcccccacgagaaaaccatctccaaagccaagggc
agccccgagaaccacagggtgacacctgccccalcccgggatgagctgaccaagaaccaggtcagcctgacctgctgtgca
aaggcttctatccagcgacatcggcgtggagtgaggagcaatgggcagccgggagaacaactacaagaccacgcctcccggtg
ctggactccgacggctccttctcctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctc
20 cgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaagcggatccttgaacctgctcc
catcctgggccattaccttaatctcagtaaatggaatttttgatgatgctgcctgacctactgctttgccccaaagatgcagagagaga
aggagggaatgagagattgagaagggaagtgtacgcctgtataaatcgatactcgag

5B9 scFv-hmflgG1-hCD80 (amino acid sequence) (SEQ ID NO: __)

MRFSAQLLGLLVLPWGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHLSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGSGGGSGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSGGITDYNAAFISRLSITKDDSK
SQVFFKMNSLQPNDAIYYCARNGGDNYPPYYAMDYWGQGTSTVTVSSDLEPKSS
30 DKTHTSPPSPAPPELLGGSSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNW
YVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP

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ENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSVMSHEALHNHYTQKSLS
LSPGKADPSNLLPSWAITLISVNGIFVICCLTYCFAPRCRERRRNERLRRESVRPV

2e12 scFv WTH CH2 CH3 (2e12 scFv-WthIgG-CD80) (nucleotide sequence) (SEQ

5 ID NO: __)

aagcttatggattttcaagtcagattttcagcttctgctaatacagtgcttcagtcataatgtccagaggagtcgacattgtgctcacc
aatctccagcttcttggctgtgtctctaggtcagagagccaccatctctgcagagccagtgaaggtgtgaatattatgcacaagtt
taatgcagtggtaccaacagaaaccaggacagccacccaaactcctcatctctgctgcacccaacgtagaatctggggtccctgcc
aggtttagtggtcagtggtgtggacagacttcagcctcaacatccatcctgtggaggaggatgataatgcaatgtatttctgtcagc
10 aaagtaggaaggttcttggacgttcggtggagggaccaagctggaaatcaaacggggtggcgggtggtcggcgagggtggg
tcgggtggcggcgatctcaggtgcagctgaaggagtcaggacctggcctggtggcgccctcacagagcctgtccatcacatgc
accgtctcaggggttcalttaaccggctatggtgtaaacgggttcgccagcctccaggaaagggtctggagtggctgggaatgat
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aaaaatgaacagctctgcaaactgatgacacagccagataclactgtgccagagatggttatagtaactttcattactatgttatggact
15 actggggtcaaggaaacctcagtcaccgtctcctcagatctggagcccaaatcttgcacaaaactcacacatgccaccgtgccca
gcacctgaactcctggggggaccgtcagcttctcttcccccaaaacccaaggacacctcatgatctccggacctctgaggt
cacatgcgtggtggtggacgtgagccacgaagacctgaggtcaagtcaactggtacgtggacggcgtggaggtgcataatgc
caagacaaagccggggaggagcagtagaacagcagctaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctga
atggcaaggagtacaagtcaaggctccaacaagccctccagccccatcgagaaaacctctccaaagccaaagggcag
20 ccccgagaaccacaggtgtacacctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgctgtgcaaa
ggcttctatcccagcgacatcgccgtggagtgggagagcaatgggcagccggagaaactacaagaccacgcctccctgct
ggactccgacggctccttctctctacagcaagctaccgtggacaagagcaggtggcagcagggaacgtcttctcatgctcc
gtgatgcatgaggtctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaacggatccttgaacctgctccc
atcctgggccattacctaatactcagtaaatggaattttgtgatagctgcctgacctactgctttgccccaaagatgcagagagagaa
25 ggaggaatgagagattgagaagggaaggtgtacgcctgtataaatcgat

2e12 scFv WTH CH2 CH3 (2e12 scFv-WthIgG-CD80) (amino acid sequence) (SEQ
ID NO: __)

MDFQVQIFSFLLISASVIMSRGVDIVLTQSPASLAVSLGQRATISCRASESVEYYVTS
30 LMQWYQQKPGQPPKLLISAASNVESGVPARFSGSGSGTDFSLNIHPVEEDDIAMYF
CQQSRKVPWTFGGGTKLEIKRGGGGSGGGSGGGGSQVQLKESGPGLVAPSQSLS
ITCTVSGFSLTGYGVNWVRQPPGKGLEWLGMIWGDGSTDYNSALKSRLSITKDNS

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KSQVFLKMNSLQTDDTARYYCARDGYSNFHYVMDYWGQGSVTVSSDLEPKS
CDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFN
WYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALP
APIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQ
5 PENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSL
SLSPGKADPSNLLPSWATLISVNGIFVICCLTYCFAPRCRERRRRNERLRRESVRPV

2H7-human IgE Fc (CH2-CH3-CH4) (nucleotide sequence) (SEQ ID NO: __)

aagcttccgccatggatttcaagtcagatttcagcttctgctaatacagtcgttcagtcataattgccagaggacaaattgttctct
10 cccagctccagcaatcctgtctgcattccaggaggagaaggtcacatgactgcagggccagctcaagtgaattacatgcact
ggtagcagcagaagccaggatcctccccaacacctggatttatccccatccaacctggcttctggagtcctctgctcgttcagtg
gcagtggtgtctgggaccttactctctcacaatcagcagagtgaggagctgaagatgctgccacttattactgccagcagtgaggatt
taaccacccacgttcggtgctgggaccaagctggagctgaaagggtggcggctggcggcgggtggatctggaggaggtg
ggagctctcaggcttatctacagcagctggggctgagctggtgaggcctggggcctcagtgagatgctctgcaaggcttctggc
15 tacacatttaccagttacaatatgcactgggttaaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
ggtgatacttctacaaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctattctgtgcaagagtggtgtactatagtaacttactggtagcttcgatgtctggggcac
agggaccacggtcaccgtctctgatcacgtctgctccagggaattcaccccgccaccgtgaagatcttacagtcgtctgcgacg
gcggcgggcaacttcccccgacctccagctcctgtgctcgtctctgggtacacccagggaactatcaacatcacctggctgga
20 ggacgggcaggtcatggacgtggactgtccaccgcctctaccacgcagggaggtgagctggcctccacacaaagcgagctca
ccctcagccagaagcactggctgtcagaccgcactacacctgccaggtcacctatcaaggtcacaccttggaggacagcaccac
gaagtgtcagattccaacccgagaggggtgagcgctacctaagccggccagcccgttcgacctgttcatccgaagtgcgc
cacgatcacctgtctggtggtggacctggcaccagcaaggggaccgtgaacctgacctggctccgggccaagtgggaagcctgt
gaaccactccaccagaaaggaggagaagcagcgcaatggcacgttaacctgcacgtccaccctgccggtgggcacccgagact
25 ggatcaggggggagacctaccagtgcagggtagccacccccacctgccaggggcctcatgggtccacgaccaagaccag
cgcccgctgctgctcccggaagtctatgcgtttgcgacgccggagtggccggggagccgggacaagcgacacctgcctgc
ctgatccagaacttcatgcctgaggacatctcgttgagtgagtgacacagaggtgcagctcccgagcggccggcacagcacg
acgcagccccgaagaccaagggtccgcttctcgtctcagccgctggaggtgaccagggccgaatgggagcagaaaga
tgagttcatctgccgtgcagtcctatgaggcagcgagccctcacagaccgtccagcgagcggtgtctgtaaatcccggtaatgat
30 aatctaga

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2H7 scFv IgE (CH2-CH3-CH4) (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 FNPPTFGAGTKLELKGGGGSGGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
 5 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
 TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSDHVCSDFTP
 PTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTASTTQE
 GELASTQSELTLSQKHWLSDRITYTCQVTYQGHTEFEDSTKKCADSNPRGVSAAYLSR
 PSPFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNGTLTV
 10 TSTLPVGTTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPEVYAFATPEWP
 GSRDKRTLACLIQNFMPEISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFSRLE
 VTRAEWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

2H7 scFv MH (SSS) MCH2WTCH3 (nucleotide sequence) (SEQ ID NO: __)

15 aagcttgcegccatggatttcaagtcagatttcagcttctgctaatacagtcgttcagtcataattgccagaggacaaattgttctct
 ccagctccagcaatcctgtctgcatctccaggggagaaggcacaatgactgcagggccagctcaagtgttaattacatgcact
 ggtaccagcagaagccaggatcctccccaaccctggatttatgccccatccaacctggcttcggagtcctctgctcgttcagtg
 gcagtggtctgggacctcttactctctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgaggatt
 taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtggctcggcggtgggtgatctggaggaggtg
 20 ggagctctcaggcttatctacagcagctctggggctgagctggtgagcctggggcctcagtgaaatgctctgcaaggctctggc
 tacacattaccagtacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
 ggtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
 cagcctgacatctgaagactctgcggtctatttctgtgcaagagtggtgtactatagtaactcttactggtacttcgatgtctggggcac
 agggaccacggtcaccgtctctctgatcaggagcccaaatcttctgacaaaactcacacatccccaccgtccccagcacctgaac
 25 tcttgggggatcgtcagcttctcttcccccaaaaccaaggacacctcatgatctccggaccctgaggtcacatgcgtg
 gtggtggacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgccaagacaaag
 ccgcgaggaggagcagtacaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaagga
 gtacaagtcaaggctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaagggcagccccgagaac
 cacaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcaaaaggcttctatcc
 30 cagcgacatcgccgtggagtgaggagagcaatgggcagccggagaacaactacaagaccacgcctcccgctgctggactccgac
 ggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatga
 ggctctgcacaaccactacacgcagaagagcctctccctgtctccggtaaatgatctaga

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2H7 scFv MH (SSS) MCH2WTCH3 (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSFLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 5 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
 TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFVDVWGTGTTVTVSSDQEPKSSDK
 THTSPSPAPELLGGSSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
 DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
 10 KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
 NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSLS
 PGK

5B9 scFv MTHWTCH2CH3 (nucleotide sequence) (SEQ ID NO: __)

15 aagcttgccgcatgaggttctctgctcagcttctggggctgcttgctctggatccctggatccactgcagatattgtgacgca
 ggctgcattctccaatccagtcactcttgaacatcagcttccatctctgcaggtctagtaagagctcctacatagtaatggcatca
 ctatttgtattggtatctgcagaagccaggccagctcctcagctcctgattatcagatgtccaacctgcctcaggagtcccagaca
 ggticagtagcagtggtcaggaactgattcacactgagaatcagcagagtgagggtgaggatgtgggtgttattactgtgtc
 aaaatctagaactccgctcacgttcggtgctgggaccaagctggagctgaacgggggtggcgggtggctcgggcgggtgggt
 20 cgggtggcggcggatgctcacaggtgcagctgaagcagtcaggacctggcctagtgcagtcctcacagagcctgtccatcacct
 gcacagtctctggttctcattaactacatgctgtacactgggttcgacagtcctcaggaaagggtctggagtggctgggagtat
 atggagtgggtgaatcacagactataatgcagcttcatatccagactgagcatcaccaaggacgattccaagagccaagtcttctt
 aaaatgaacagtctgaacctaataacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatgga
 ctactggggtaaggaacctcagtcaccgtctctctgacagagcccaaatcttctgacaaaactcacatccccaccgtcccc
 25 agcacctgaactcctgggggaccgtcagttctcttcccccaaaaccaaggacacctcatgatctccggacctgag
 gtcacatgcgtggtggtggacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataat
 gccaaagacaaagccggggaggagcagtaacagcacgtaccgtgtggtcagcgtctcaccgtcctgcaccaggactggct
 gaatggcaaggagtacaagtgaaggtctcaacaaagccctcccagccccatcgagaaaacaatctcaaagccaaagggc
 agccccgagaaccacaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagctgacctgctgtgta
 30 aagcttctatcccagcgacatcgccgtggagtgggagagcaatgggcagccggagaaactacaagaccacgcctccgtg
 ctggactccgacggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctc
 cgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

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5B9 scFv MTHWTCH2CH3 (amino acid sequence) (SEQ ID NO: __)

MRFSAQLLGLLVLPWGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHNSNGITY
LYWYLQKPGQSPQLLIYQMSNLAAGVPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
5 AQNLELPLTFGAGTKLELKRGGGGSGGGGSGGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSSGGITDYNAAFISRLSITKDDSK
SQVFFKMNSLQPNDAIYYCARNGGDNYPIYYAMDYWGQGTSVTVSSDQEPKSS
DKTHTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNW
YVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
10 PIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP
ENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLS
LSPGK

Human IgG1 hinge mutations

2H7 scFv- MTH (CSS) WTCH2CH3 (nucleotide sequence) (SEQ ID NO: __)

15 aagcttgccgccatggatttcaagtcagatttcaagcttctgctaatactgcttcagtcataattgccagaggacaaattgtctct
cccagctccagcaatcctgtctgcattccaggggagaaggtcacatgactgcagggccagctcaagtgttaattacatgcact
ggtagcagcagaagccaggatcctccccaaccctggattatgccccccaacctggcttctggagtcctgtctgcttcagtg
gcagtggtgtgggaccttactctctcacaatcagcagagtgagggtgaagatgctgccattactgccagcagtgaggatt
20 taaccacccacgttcggtgtgggaccaagctggagctgaagatggcgggtggctcgggcgggtggatctggaggaggtg
ggagctctcaggcttatctacagcagctcggggtgagctggtagggcctggggcctcagtgagatgctcgaaggctctggc
tacacattaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctattatccaggaaat
ggtagacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcgggtctatttctgtgaagagtggtgtactatagtaactcttactggtagctctgatgtctggggcac
25 agggaccacggtcaccgtctctctgatcaggagcccaaatctgtgacaaaactcacacatccccaccgtcccagcacctgaac
tctggggggaccgtcagcttctcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtg
gtgtgggacgtgagccacgaagacctgaggtcaagttcaactggtagctggagcggcgtggaggtgcataatgccaagacaaag
ccgcggggaggagcagtacaacagcagctaccgtgtgtgcagcgtcctaccgtctgcaccaggactggctgaatggcaagga
gtacaagtgaaggtctccaacaagccctccagccccatcgagaaaacaatctcaaaagccaaggcagccccgagaac
30 cacaggtgtacacctgccccatcccggtgatgagctgaccaagaaccaggtcagcctgacctgctgtgcaaggcttctatcc
cagcgacatcgccgtggagtgaggagcaatgggcagccggagaacaactacaagaccacgcctcccggtgctggactccgac

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ggctccttcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgttctcatgctccgtgatcatga
ggctctgcacaaccactacacgcagaagagcctctccctgtctccggtaaatgatctaga

2H7 scFv- MTH (CSS) WTCH2CH3 (amino acid sequence) (SEQ ID NO: __)

5 MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPTTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFVDVWGTGTTVTVSSDQEPKSCDK
10 THTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLS
PGK

15

2H7 scFv- MTH (SCS) WTCH2CH3 (nucleotide sequence) (SEQ ID NO: __)

aagcftgccgcatggatttcaagtcagatttcagcttctgctaatacagtgcttcagtcataatgccagaggacaaatgttctct
cccagctccagcaatcctgtctgcctccaggggagaaggtcacatgactgcagggccagctcaagtgaattacatgcact
ggtaccagcagaagccaggatcctccccaaccctggattatgccccatccaacctggcttctggagtcctgctcgcttcagtg
20 gcagtggtgtgggaccttactctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgaggttt
taaccacccacgttcggtgtgggaccaagctggagctgaagatggcgggtggctgggaggtggtgagtgaggaggtg
ggagctctcaggcttactacagcagctcggggtgagctggtgaggcctgggacctcagtgagatgctctgcaaggcttctggc
tacacattaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctattatccaggaaat
ggtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
25 cagcctgacatctgaagactctgcggtctattctgtgcaagagtggtgtactatagtaactttactggtacttcgatgtctggggcac
agggaccacggtcaccgtctcttgatcaggagcccaaatcttctgacaaaactcacacatgccaccgtcccagcacctgaac
tcttggggggaccgtcagcttctcttcccccaaaaccaaggacacctcatgatctccggaccctgaggtcacatgcgtg
gtggfaggcgtgagccacgaagacctgaggtcaagtcaactggtacgtggacggcgtggaggtgcataatccaagacaaag
ccgcgggaggagcagtaacagcacgtaccgtgtggtcagcgtctcaccgtctgcaccaggactggctgaatggcaagga
30 gtacaagtgaaggctccaacaaagccctcccagccccatcgagaaaacaatctcaaagccaaagggcagccccgagaac
cacaggtgtacacctgccccatcccggaagagctgaccaagaaccaggtcagcctgacctgcctggtaaggcttctatcc

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cagcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgcctcccgtgctggactccgac
ggctccttcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgttctcatgctccgtgatgcatga
ggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

- 5 **2H7 scFv- MTH (SCS) WTCH2CH3 (amino acid sequence) (SEQ ID NO: __)**
MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
10 TAYMQLSSLTSEDSAVYFCARVVYYNSYWFVDVWGTGTTVTVSSDQEPKSSDK
THTCPPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
15 SPGK

- 2H7 scFv- MTH (SSC) WTCH2CH3 (nucleotide sequence) (SEQ ID NO: __)**
aagcttgcgccatggatttcaagtcagatttgcagttcctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagtcctcagcaatcctgtctgcactccaggggagaaggtcacaatgacttcagggccagctcaagtgttaagttacatgcact
20 ggtaccagcagaagccaggatcctcccccaccctggatttatcccatcaacctggcttctggagtcctgtcgttcagtg
gcagtggtgttggtaccttactctctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgagttt
taaccacccacgttcggtgtggtggaccaagctggagctgaagatggcgggtggctcggcggtggtggatctggaggaggtg
ggagctctcaggcttatctacagcagctcggggctgagctggtgaggcctggggcctcagtgagatgtcctgcaaggcttctggc
tacacatttaccagttacaatatgcactgggtaaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
25 ggtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctatttctgtgaagagtggtgtactatagtaacttactgtgacttcgatgtctggggcac
agggaccacggtcaccgtctcttctgatcaggagcccaaatcttctgacaaaactcacacatccccaccgtgccagcactgaac
tcttggggggaccgtcagcttctcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtg
gtgtggacgtgagccacgaagacctgaggtcaagttaactgtcagtggtggcgtggaggtgcataatgccaagacaaag
30 ccgcgggaggagcagtacaacagcagctaccgtgtgtgcagcgtcctcaccgtcctgcaccaggactggctgaatggcaagga
gtacaagtgcaggctccaacaagccctccagcccccacgagaaaacaatctccaaagccaaagggcagccccgagaac

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cacaggtgtacacctgccccatcccggtgatgagctgaccaagaaccaggtcagcctgacctgcctggtaaaggcttctatcc
cagcgacatcgccgtggagtgaggagagcaatgggcagccggagagaacaactacaagaccacgcctcccgctgctggactccgac
ggctccttctctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcata
ggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

5

2H7 scFv- MTH (SSC) WTCH2CH3 (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
10 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFVDVWGTGTTVTVSSDQEPKSSDK
THTSPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
15 NNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
SPGK

HIgGMHcys1 (nucleotide sequence) (SEQ ID NO: __)

ggt ggt gat cag gag ccc aaa tct tct gac aaa act cac aca tg

20

HIgGMHcys2 (nucleotide sequence) (SEQ ID NO: __)

ggt ggt gat cag gag ccc aaa tct tgt gac aaa act cac aca tct cca ccg tgc

HIgGMHcys3 (nucleotide sequence) (SEQ ID NO: __)

25 ggt ggt gat cag gag ccc aaa tct tgt gac aaa act cac aca tgt cca ccg tcc cca gca cct

HuIgG1 MTCH3Y405 (nucleotide sequence) (SEQ ID NO: __)

gggcagccccgagaaccacaggtgtacacctgccccatcccgaggagatgaccaagaaccaggtcagcctgacctgcct
gggtcaaaggcttctatcccgagacatcgccgtggagtgaggagagcaatgggcagccggagagaacaactacaagaccacgcctc

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ccgtgctggactccgacggctcctctacctctatagcaagctcaccgtggacaagagcagggtggcagcaggggaacgtctctc
atgctccgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

HuIgG1 MTCH3Y405 (amino acid sequence) (SEQ ID NO: __)

5 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSGDSFYLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1 MTCH3A405 (nucleotide sequence) (SEQ ID NO: __)

gggcagccccgagaaccacaggtgtacacctgccccatcccgaggagatgaccaagaaccaggtcagcctgacctgcct
10 ggtcaaaggcttctatcccagcgacatcgccgtggagtgaggagagcaatgggcagccggagaacaactacaagaccacgcctc
ccgtgctggactccgacggctccttcgacctctatagcaagctcaccgtggacaagagcagggtggcagcaggggaacgtctctc
atgctccgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

HuIgG1 MTCH3A405 (amino acid sequence) (SEQ ID NO: __)

15 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSGDSFALYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1 MTCH3A407 (nucleotide sequence) (SEQ ID NO: __)

Gggcagccccgagaaccacaggtgtacacctgccccatcccgaggagatgaccaagaaccaggtcagcctgacctgcc
20 tggtaaaggcttctatcccagcgacatcgccgtggagtgaggagagcaatgggcagccggagaacaactacaagaccacgcct
cccgtgctggactccgacggctccttctcctgccagcaagctcaccgtggacaagagcagggtggcagcaggggaacgtctctc
catgctccgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

HuIgG1 MTCH3A407 (amino acid sequence) (SEQ ID NO: __)

25 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSGDSFFLASKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1 MTCH3Y405A407 (nucleotide sequence) (SEQ ID NO: __)

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gggcagccccgagaaccacaggtgtacacctgccccatccgggaggagatgaccaagaaccaggtcagcctgacctgcct
gggtcaaaggcttctatcccagcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgcctc
ccgtgctggactccgacggctccttctacctcgccagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctc
atgctccgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

5

HuIgG1 MTCH3Y405A407 (amino acid sequence) (SEQ ID NO: __)

GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPP
VLDSGDSFYLASKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

10 **HuIgG1 MTCH3A405A407 (nucleotide sequence) (SEQ ID NO: __)**

gggcagccccgagaaccacaggtgtacacctgccccatccgggaggagatgaccaagaaccaggtcagcctgacctgcct
gggtcaaaggcttctatcccagcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgcctc
ccgtgctggactccgacggctccttctacctcgccagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttct
catgctccgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

15

HuIgG1 MTCH3A405A407 (amino acid sequence) (SEQ ID NO: __)

GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPP
VLDSGDSFALASKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

20 **2H7 scFv MTH (SSS) WTCH2MTCH3Y405 (nucleotide sequence) (SEQ ID NO: __)**

aagcttgcgccaatggattttcaagtgacagatttcagcttctgctaatactgcttcagtcataattgccagaggacaaattgttctct
cccagcttccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttgaggccagctcaagtgttaattacatgcact
ggtagcagcagaagccaggatcctccccaaacctggatttatgccccatccaacctggcttctggagtcctgctcgttcagtg
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taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtggctcgggagggtggatctggaggaggtg
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tacacattaccagttacaatatgcactgggtaaagcagacacctagacaggcctggaatggattggagctatttatccaggaat
gggtatacttctacaatcagaagttcaaggccaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctatttctgtgcaagagtgggtactatagtaactcttactgggtactctgatgtctggggcac
agggaccacggtcaccgtctctctgatcaggagcccaaatcttctgacaaaactcacacatccccaccgtccccagcacctgaac

30

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tcctgggggaccgtcagttctctctcccccaaaaccaaggacacctcatgatctccggaccttgaggtcacatgctg
gtgggtggacgtgagccacgaagacctgaggtcaagttcaactggtagtgacggcgtggaggtgcataatgccaagacaaag
ccgggggaggagcagtacaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaagga
gtacaagtgaaggtctccaacaagccctcccagccccatcgagaaaacaatctcaaagccaaaggcagccccgagaac
5 cacaggtgtacacctgccccatccgggaggagatgaccaagaaccagggtcagcctgacctgctgtaaaggcttctatcc
cagcgacatcgccgtggagtgaggagagcaatgggcagccggagaacaactacaagaccacgcctcccgtgctggactccgac
ggctctctacctctatagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatga
ggctctgcacaaccactacacgcagaagagcctctcctgtccccgggtaaatgatctaga

10 **2H7 scFv MTH (SSS) WTCH2MTCH3Y405 (amino acid sequence) (SEQ ID NO: __)**
MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
15 TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
THTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSGDFYLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
20 PGK

2H7 scFv MTH (SSS) WTCH2MTCH3A405 (nucleotide sequence) (SEQ ID NO: __)
aagcttgccgcatgatttcaagtcagattttcagcttctgctaatactgcttcagtcataattgccagaggacaaattgttctct
cccagcttccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgaattacatgcact
25 ggtaccagcagaagccaggatctcccccaaacctggatttatccccatccaacctggcttctggagtccctgctcgttcagtg
gcagtggtgctgggaccttactcttcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgaggatt
taaccacccacgttcggtgctgggaccaagctggagctgaagatggcgggtggctcgggcgggtggatctggaggaggtg
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2H7 scFv MTH (SSS) WTCH2MTCH3A405 (nucleotide sequence) (SEQ ID NO: __)

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20 2H7 scFv MTH (SSS) WTCH2MTCH3A407 (nucleotide sequence) (SEQ ID NO: __)

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TAYMQLSSLTSEDSAVYFCARVYYSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
15 THTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
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2H7 scFv MTH (SSS) WTCH2MTCH3Y405A407 (nucleotide sequence) (SEQ ID NO: __)

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2H7 scFv MTH (SSS) WTCH2MTCH3Y405A407 (amino acid sequence) (SEQ ID NO: __)

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20 KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
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2H7 scFv MTH (SSS) WTCH2MTCH3A405A407 (nucleotide sequence) (SEQ ID NO: __)

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2H7 scFv MTH (SSS) WTCH2MTCH3A405A407 (amino acid sequence) (SEQ ID
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 20 TAYMQLSSLTSEDSAVYFCARVYYSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
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 25 PGK

2H7 scFv MTH (SCC) WTCH2CH3 (nucleotide sequence)
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2H7 scFv MTH (SCC) WTCH2CH3 (amino acid sequence)

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2H7 scFv MTH (CSC) WTCH2CH3 (nucleotide sequence)

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2H7 scFv MTH (CSC) WTCH2CH3 (amino acid sequence)

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2H7 scFv MTH (CCS) WTCH2CH3 (nucleotide sequence)

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2H7 scFv MTH (CCS) WTCH2CH3 (amino acid sequence)

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25 VDGEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
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SPGK

30 **HuIgAHIgA-T4-ORF (nucleotide sequence)**

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5 cgctaaccgccaccctctcaaaatccggaacacattccggcccgaggtccacctgctgccgccgctcgaggagctggccc
tgaacgagctgggtgacgtgacgtgcctggcacgtggcttcagccccaaggatgtgctggttcgctggctgcaggggtcacagg
agctgccccgcgagaagtacctgacttgggcatccggcaggagcccagccagggcaccaccaccttgcgtgtgaccagcata
ctgcgctggcagccgaggactggaagaagggggacaccttctctgcatggtggccacgaggccctgccgtggccttcac
acagaagaccatcgaccgcttggcgggtaaacccacccatgtcaatgtgtctgtgtcatggcggaggtggacgcggatccttga
10 ac

HuIgAHIgA-T4-ORF (amino acid sequence)

DQVPVSTPPTSPSTPPTSPSCCHPRLSLHRPALEDLLLGSEAILTCTLTGLRDASGV
TFTWTPSSGKSAVQGPDRDLGCGYSVSSVLPGCAEPWNHKGTFCTAAYPESKT
15 PLIATLSKSGNTFRPEVHLLPPPSEELALNELVTLTCLARGFSPKDVLRWLQGSQ
ELPREKYLTWASRQEPSQGTTFFAVTSILRVA AEDWKKGDTFSCMVGHEALPLAF
TQKTIDRLAGKPTHVNVSVVMAEVDADPSN

1D8-IgAH IgA-T4-CD80 (nucleotide sequence)

20 aagcttatggatttcaagtgcagatttcagcttctgctaatacgtgcttcagtcataatgtccagaggagtcgacattgtgctcactc
agtctccaacaacatagctgcatctccaggggagaaggtcaccatcacctgccgtgccagctccagtgaagtacatgtactggt
accagcagaagtcaggcgccctcccctaaactctggatttatgacacatccaagctggcttctggagttccaaatcgcttcagtggca
gtgggtctgggacctctattctctcgaatcaacaccatggagactgaagatgctgccacttattactgtcagcagtgagtagtact
ccgctcacgttcgggtctgggaccaagctggagatcaaacgggggtggcgggtggctcgggcgggtgggtgggtggcggcg
25 gatctcaggtgcagctgaaggaggcaggacctggcctgggtgcaaccgacacagacctgtccctcacatgcactgtctctgggtt
ctcattaaccagcgtggtgtacactggattcgacagcctccaggaaagggtctggaatggatgggaataatatattatgatggagg
cacagattataattcagaattaaatccagactgagcatcagcaggacacctccaagagccaagtttcttaaaaaatcaacagctctg
caaatgatgacacagccatgtattactgtgccagaatccactttgattactggggccaaggagtcattggtcacagtctcctctgac
agccagttccctcaactccacctaccccatctccctcaactccacctaccccatctccctcatgctgccacccccgactgtcactgca
30 ccgaccggccctcgaggacctgctcttaggttcagaagcgatcctcacgtgcacactgaccggcctgagagatgcctcaggtgtc
accttcacctggacgccctcaagtgggaagagcgctgttcaaggaccacctgacctgtgtggctgctacagcgtgtcca

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gtgtcctgccgggctgtgccgagccatggaacatgggaagaccttcactgcactgctgcctaccccagtgccaagaccccgt
aaccgccaccctctcaaatccggaaacacattccggcccagggtccacctgctgccgccccgctcggaggagctggccctgaa
cgagctgggtgacgctgacgtgcctggcacgtggcttcagcccaaggatgigtgtgtcgtgctgaggggtcacaggagct
gccccgcgagaagtacctgacttgggcatcccgaggagcccagggcaccaccaccttcgctgtgaccagcactactgc
5 gctgtggcagccgaggactggaagaagggggacaccttctcctgcatggtgggcccagaggccctgccgtggccttcacacag
aagaccatcgaccgcttggcgggtaaacccacccatgcaatgtgtctgtgtcatggcgagggtgacgcggatccttcgaacaa
cctgtcccatcctgggccattaccttaatctcagtaaatggaattttgtgatgtgctgcctgacctactgctttccccaagatgcag
agagagaaggaggaatgagagattgagaagggaagtgtacgccctgtataaatcgatac

AA

10 **1D8 scFv IgAH IgA-T4-CD80 (amino acid sequence)**

MDFQVQIFSFLISASVIMSRGVDIVLTQSPTTIAASPGEKVTTTCRASSSVSYMYWY
QQKSGASPKLWIYDTSKSLASGVNRFSGSGSGTSYSLAINTMETEDAATYYCQQW
SSTPLTFSGTKLEIKRGGGSGGGGSGGGGSGVQLKEAGPGLVQPTQTLSLTCTV
SGFSLTSDGVHWIRQPPGKGLEWMGIHYDGGTDYNSAIKSRLSISRDTSKSQVFLK
15 INSLQTDDTAMYYCARIHFDYWGQGVMTVSSDQVPSTPPTPSPSTPPTPSPSCC
HPRLSLHRPALEDLLLGSEAILTCTLTGLRDASGVTFWTWTPSSGKSAVQGPPDRDL
CGCYSVSSVLPGAEPWNHGKTFTCTAAYPESKTPLTATLSKSGNTRPEVHLLPP
PSEELALNELVTLTCLARGFSPKDVLRWLQGSQELPREKYLTWASRQEPSQGT
FAVTSILRVAEDWKKGDTFSCMVGHEALPLAFTQKTIDRLAGKPTHVNVSVVM
20 AEVDADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRERRRNERLRRESVRPV

human IgE Fc (CH2-CH3-CH4) ORF (nucleotide sequence)

tgtacacgtctgtccagggacttcacccgccaccgtgaagatcttacagtcgtcctgcgacggcgggcacttcccccg
accatccagctcctgtgcctcgtctctgggtacacccagggatcatcaacatcacctggctggaggacgggcagggtcatggacg
25 tggactgtccaccgcctctaccacgcaggagggtgagctggcctccacaaaagcgagctcacctcagccagaagcactggc
tgtcagaccgcacctacacgtgccaggtcacctatcaaggtcacaccttgaggacagcaccagaaggtgtgcagattccaacc
gagaggggtgagcgctacctaagccggccagcccgttcacctgttcacgcgaagtcgccacgatcacctgtctggtggtg
gacctggcaccagcaaggggaccgtgaacctgacctgtgtccggggccagtggaagcctgtgaaccactccaccagaaagg
aggagaagcagcgcaatggcacgttaacctgcacgtccacctgccggtgggcacccgagactggatcaggggggagacct
30 ccagtgcagggtgaccacccccacctgccaggccctcatcggtccacgaccaagaccagcgcccgctgctgccccg
gaagtctatgcgttgcgacgccggagtgccggggagccgggacaagcgacccctgcctgctgatccagaacttcacct

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gaggacatctcggctgcagtggctgcacaacgaggtgcagctcccgagcccgccacagcacgacgcagccccgcaagacc
aagggctccggcttctcgtcttcagccgcctggaggtgaccagggccgaatgggagcagaaagatgagttcatctgccgtgcag
tccatgaggcagcgagccccctcacagaccgtccagcgagcgggtgtctgtaaatcccggtaaagcggatccttcgaa

AA

5 **human IgE Fc (CH2-CH3-CH4) ORF (amino acid sequence)**

DHVCSDFTPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDV
DLSTASTTQEGELASTQSELTLQKHWLSDRTYTCQVTYQGHTEFEDSTKKCADSN
PRGVSAAYLSRSPFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKE
EKQRNGTLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPE
10 VYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTK
GSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGKADPS

1D8 scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttatggatttcaagtcagatttcagcttctgtaatacagtgcttcagtcataatgtccagaggagtcgacatitgtgtcactc
15 agtctccaacaaccatagctgcatctccaggggagaagggtcaccatcacctgccgtgccagctccagtgtaagttacatgtactggt
accagcagaagtcaggcgcctccccctaaactctgatttatgacacatccaagctggcttctggagttccaaatcgttcagtgga
gtgggtctgggacctcttattctctcgaatcaacacatggagactgaagatgctgccacttattactgtcagcagtgaggtagtact
ccgtcacgttcgggtctgggaccaagctggagatcaaacgggggtggcgggtggctcgggcgggtgggtgggtcgggtggcg
gatctcaggtgcagctgaaggaggcaggacctggcctggtgcaaccgacacagaccctgtccctcacatgcactgtctctgggtt
20 ctcaataaccagcgtggtgtactggttcgacagcctccaggaaagggtctggaatggatgggaataatattatgatggagg
cacagattataattcagcaattaaatccagactgagcatcagcaggacacctccaagagccaagtttcttaaaaatcaacagctg
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ccagctcctgtgcctcgtctctgggtacacccagggactatcaacatcacctggctggaggacgggcaggtcatggagctggac
25 ttgtccaccgcctctaccacgcaggagggtgagctggcctccacaaaagcagctcacctcagccagaagcactggctgtca
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gggtgagcgcctacctaagccggccagccggtcagctgttcatccgcaagtcgccacgatcacctgtctggtggtggacct
ggcaccagcaaggggaccgtgaacctgacctgggtccggggcagtggaagcctgtgaacctccaccagaaaggaggag
aagcagcgcaatggcacgttaaccgtcacgtccacctgccgggtgggcacccgagactggatcaggggggagacctaccagt
30 cagggtgacccacccccacctgcccaggccctcatcgggtccacagaccaagaccagcgcccgctgctgccccggaagtct
atgcgtttgcgacgccggagtggccggggagccgggacaagcgcaccctcgctgcctgatccagaactcatgcctgaggac

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atctcgggtgcagtggctgcacaacgaggtgcagctcccgacgcccggcacagcacgacgcagccccgaagaccaagggct
ccggcttcttcgtcttcagccgcctggaggtgaccagggccgaatgggagcagaaagatgagttcatctgccgtgcagtcctatga
ggcagcgagccccctcacagaccgtccagcagcgggtgtctgtaaattcccgtaaagcgatccttcgaagctcccatcctgggc
cattaccttaatctcagtaaatggaattttgtgatatgctgcctgacctactgctttgcccccaagatgcagagagagaaggagggaatg
5 agagattgagaagggaaaagtgtacgccctgtataaatcgata

1D8-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)

MDFQVQIFSLLISASVIMSRGVDIVLTQSPTTIAASPGEKVTITCRASSSVSYMYWY
QQKSGASPKLWIYDTSKLASGVPNRFSGSGSGTSYSLAINTMETEDAATYYCQQW
10 SSTPLTFGSGTKLEIKRGGGSGGGGSGGGGSQVQLKEAGPGLVQPTQTLSLTCTV
SGFSLTSDGVHWIRQPPGKGLEWMGIYYDGGTDYNSAIKSRLSISRDTSKSQVFLK
INSLQTDDTAMYYCARIHFDYWGQGVMTVSSDHVCSRDFTPPTVKILQSSCDGG
GHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTASTTQEGELASTQSELTL
QKHWLSDRTYTCQVTYQGHTFEDSTKKCADSNPRGVSAYLSRPSPFDLFIRKSPTI
15 TCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNGTLTVTSTLPVGTRDWI
EGETYQCRVTHPHLPRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLI
QNFMPEDISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFSRLEVTRAWEQKDE
FICRAVHEAASPSQTVQRAVSVNPGKADPSKLPWAITLISVNGIFVICCLTYCFAP
RCRERRRNERLRRESVRPV

20

5B9-IgAH IgA-T4-CD80 (nucleotide sequence)

aagcttgccgccatgaggttctctgctcagcttctggggctgcttctgctctggatccctggatccactgcagataattgtgatgacgca
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cttatttgatttggtatctgcagaagccaggccagtcctcctcagctcctgatttatcagatgtccaacctgcctcaggagtcaggaca
25 ggttcagtagcagtggtcaggaactgattcacactgagaatcagcagagtgaggagtgaggatgtgggtgtttattactgtgctc
aaaactagaactccgctcacgttcggtgctgggaccaagctggagctgaaacgggggtggcgggtggctcgggcgggtggtgggt
cgggtggcggcgatgctcacaggtgcagctgaagcagtcaggacctggcctagtgcagtcctcacagacgtgtccatcacct
gcacagtctctggtttctattaactacatgctgtacactgggttcgccagctcctcaggaaagggtctggagtggctgggagtgat
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30 aaaatgaacagtctgcaacctaatgacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatgga
ctactgggggtcaaggaaacctcagtcaccgtctcctctgatcagccagttccctcaactccactaccccatctccctcaactccact

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accccatctccctcatgctgccacccccgactgtcaactgcaccgaccggccctcgaggacctgctcttaggttcagaagcgatcct
cacgtgcacactgaccggcctgagagatgcctcaggtgtcaccttcacctggacgccctcaagtgggaagagcgctgttcaagga
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5 cacctgctgccgccgccgtcgaggagctggccctgaacgagctggtgacgctgacgtgcctggcagctggcttcagcccca
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gccagggcaccaccaccttcgctgtgaccagcactgcgcgtggcagccgaggactggaagaagggggacaccttctcctgc
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ctgtgtcatggcggaggtggacgcggatccttcgaacaacctgctcccatcctggccattaccttaatctcagtaaatggaatttt
10 gtgatatgctgcctgacctactgctttgccccaaagtgcagagagagaaggaggaatgagagattgagaagggaagtgtacgcc
ctgtataaatcgatac

5B9-IgAH IgA-T4-CD80 (amino acid sequence)

MRFSAQLLGLLVLPWPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHLSNGITY
15 LYWYLQKPGQSPQLLIYQMSNLASGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLIFGAGTKLELKRGGGSGGGSGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVWSSGITDYNAAFISRLSITKDDSK
SQVFFKMNSLQPNDAIYYCARNGGDNYPIYYAMDYWGQGTSTVTVSSDQVPVST
PPTPSPSTPPTPSPSCCHPRLSLHRPALEDLLLSEAILTCTLTGLRDASGVTFWTTPS
20 SGKSAVQGPPDRDLGCGYSVSSVLPGCAEPWNHKGKFTCTAAYPESKTPLTATLS
KSGNTFRPEVHLLPPPSEELALNELVTLTCLARGFSPKDLVRWLQGSQELPREKY
LTWASRQEPSQGTTFFAVTSILRVAAEDWKKGDTFSCMVGHEALPLAFTQKTIDR
LAGKPTHVNVSVVMAEVDADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRER
RRNERLLRESVRPV

25

5B9-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttgccgcatgaggttctctgctcagcttctggggctgcttgtgctctggatccctggatccactgcagataattgtgatgacga
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cttatttgatttggtatctgcagaagccaggccagctcctcagctcctgatttatcagatgtccaacctgcctcaggagtccagaca
30 gggtcagtagcagtggtcaggaaactgattcacactgagaatcagcagagtgagggtgaggatgtgggtgtttattactgtgctc
aaaatctagaactccgctcacgttcggtgctgggaccaagctggagctgaaacgggggtggcgggtggctcgggcgggtgggtgggt

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cgggtggcggcgatcgtcacaggtgcagctgaagcagtcaggacctggcctagtgcagtcctcacagagcctgtccatcacct
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atggagtgggtgaatcacagactataatgcagctttcatatccagactgagcatcaccaaggacgattccaagagccaagtttttt
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5 ctactggggtaaggaacctcagtcaccgtctctctgatcacgtctgtccagggaacttaccctgcccaccgtgaagatcttaca
gtctctctgcgacggcgggcggtcacttccccccaccatccagctctgtgcctcgtctctgggtacacccagggaactatcaac
atcacctggctggaggacgggcaggtcatggacgtggacttgcaccgcctctaccacgcaggagggtgagctggcctccaca
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aggacagcaccaagaagtgtgcagattccaacccgagaggggtgagcgctacctaagccggcccagccgttcgacctgttca
10 tccgcaagtcgcccacgatcacctgtctgggtgggacctggcaccagcaaggggaccgtgaacctgacctggctccggggcca
gtgggaagcctgtgaaccactccaccagaaggaggagaagcagcgcaatggcacgttaacctgacctccacctgcccgtg
ggcacccgagactggatcgagggggagacctaccagtgcaggggtgacccaccccccacctgcccaggggccctcatcggtcca
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gcacctcgcctgcctgatccagaacttcatgcctgaggacatctcgggtgcagtggctgcacaacgaggtgcagctcccgacgc
15 ccggcacagcacgacgcagccccgaagaccaagggtccggcttctctctcagccgcctggaggtgaccaggggccgaat
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actgcttggcccaagatgcagagagagaaggaggaatgagagattgagaagggaagtgtacgcctgtataaatcgata

20 **5B9-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)**

MRFSAQLLGLLVLPWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGSGGGGSGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSGGITDYNAAFISRLSITKDDSK
25 SQVFFKMNSLQPNDAIYYCARNGGDNYPIYYAMDYWGQGTSVTVSSDHVCSR
DFTPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTAS
TTQEGELASTQSELTLSQKHWLSDRTYTCQVTYQGHTFEDSTKKCADSNPRGVSA
YLSRPSFDLFIKSPITITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNG
TLTVTSTLPVGTDRDIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPEVYAFATP
30 EWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFS
RLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVPNGKADPSKLPWAITLISV
NGIFVICCLTYCFAPRCRERRRNERLRRESVRPV

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2e12-scFv-IgAH IgA-T4-CD80 (nucleotide sequence)

aagcttatggattttcaagtcagattttcagcttcctgctaatacagtgcttcagtcataatgtccagaggagtcgacattgtgctcacc
aatctccagcttctttggctgtgtctctaggtcagagagccaccatctcctgcagagccagtgaaggttgatattatgtcacaaagt
5 taatgcagtggtaccaacagaaaccaggacagccacccaaactcctcatctctgctgcatccaacgtagaatctggggctccctgcc
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aaagtaggaaggttccttgacgttcggaggagccaccaagctggaatcaaacgggggtggcgggtggctcgggcggaggtggg
tcgggtggcggcgatctcaggtgcagctgaaggagtcaggacctggcctgggtggcggcctcacagagcctgtccatcacatgc
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10 atgggggtgatggaagcacagactataattcagctctcaaatccagactgagcatcaccaaggacaactccaagagccaagtttctt
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acgtgcacactgaccggcctgagagatgcctcaggtgtcaccttcacctggacggcctcaagtgggaagagcgctgttcaaggac
15 cacctgacagtgacctctgtggctgtacagcgtgtccagtgctcctgccgggctgtgccgagccatggaacctgggaagaccttc
acttgacagtgctgcciaccccgagtcgaagaccccgtaaccgccacctctcaaaatccggaaacacattccggcccgagggtcc
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ccagggcaccaccaccttcgctgtgaccagcactactgcgctggcagccgaggactggaagaagggggacaccttctcctgcat
20 ggtgggcccagaggccctgccgctggccttcacacagaagaccatcgaccgcttggcgggtaaacccacccatgtcaatgtgtct
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gatatgtgcctgacctactgcttgcaccaagatgcagagagagaaggaggaatgagagattgagaagggaagtgtacgcct
gtataaatcgatac

25 2e12-scFv-IgAH IgA-T4-CD80 (amino acid sequence)

MDFQVQIFSLLISASVMSRGVDIVLTQSPASLAVSLGQRATISCRASESVEYYVTS
LMQWYQQKPGQPPKLLISAASNVESGVPARFSGSGSGTDFSLNIHPVEEDDIAMFY
CQQSRKVPWTFGGGTKLEIKRGGGSGGGGSGGGGSQVQLKESGPGLVAPSQSL
ITCTVSGFSLTGYGVNWVRQPPGKLEWLGMWGDGSTDYNSALKSRLSITKDNS
30 KSQVFLKMNSLQTDDTARYYCARDGYSNFHYVMDYWGQGTSTVTVSSDQPVPS
TPPTPSPSTPPTPSPSCCHPRLSLHRPALEDLLLGSEAILTCTLTGLRDASGVTFTWTP
SSGKSAVQGPPDRDLGCYSVSSVLPGCAEPWNHKGKTFTCTAAYPESKTPLTATLS

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KSGNTFRPEVHLLPPPSEELALNELVTLTCLARGFSPKDVLRWLQGSQELPREKY
LTWASRQEPSQGTTFFAVTSILRVAEDWKKGDTFSCMVGHEALPLAFTQKTIDR
LAGKPTHVNVSVVMAEVDADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRER
RRNERLRRESVRPV

5

2e12-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttatggatttcaagtcgagatttcagcttcctgctaatacagtcctcagtcataatgtccagaggagtcgacattgtgtcaccc
aatctccagcttcttggctgtgtctctaggtcagagagccaccatctctgcagagccagtgaagtgttgatattatgtcacaagtt
taatgcagtggtaccaacagaaaccaggacagccacccaaactcctcatctctgctgcaccaacgtagaatctggggtccctgcc
10 aggtttagtggcagtgggctctgggacagacttcagcctcaacatccatctgtggaggaggatgatattgcaatgtatttctgtcagc
aaagtaggaaggttccttggacgttcgggtggaggcaccagctggaaatcaaacggggtggcgggtggctcgggcggaggtggg
tcgggtggcggcgatctcaggtgcagctgaaggagtcaggacctggcctgggtggcgccctcacagagcctgtccatcacatgc
accgtctcagggttctcattaaccggctatggtglaaactgggttcgccagcctccaggaaagggtctggagtggctgggaatgat
atggggtgatggaagcacagactataattcagctctcaaattccagactgagcaicaccaaggacaactccaagagccaagtlttct
15 aaaaatgaacagctgcaaactgatgacacagccagatactactgtgccagagatggttatagtaacttccattatgttatggact
actggggtaaggaacctcagtcaccgtctctcagatcacgtctgtccagggttcaccccgccaccgtgaagatcttacag
tcgtctcgcagcggcggcgacacttcccccgaccatccagctcctgtgcctcgtctctgggtacaccccagggaactatcaacat
cacctggctggaggacgggcaggtcatggacgtggactgtccaccgcctctaccacgcaggagggtgagctggcctccacac
aaagcgagctcacctcagccagaagcactggctgtcagaccgcacctacacctgccaggtcacctatcaaggtcacaccttga
20 ggacagcaccaagaagtgtgcagattccaacccgagaggggtgagcgcctacctaaagccggcccagcccgttcgacctgttcat
ccgcaagtcgccacgatcacctgtctggtgggtggacctggcaccagcaaggggacctgtaacctgacctggtccgggcca
gtgggaagcctgtgaaccactccaccagaaaggaggagaagcagcgaatggcacgttaacctgcacgtccacctgccggtg
ggcaccggagactggatcgagggggagacctaccagtgcaggggtgacccacccccacctgccaggggccctcatcggtcca
cgaccaagaccagcggcccgctgtgccccggaagtctatgcgttgcgacgccggagtggccggggagccgggacaagc
25 gcacctcgcctgcctgatccagaactcatgcctgaggacatctcgggtcagtggtgcacaacgaggtgcagctcccggaagc
ccggcacagcacgacgcagccccgaagaccaagggtccggcttctcgtcttcagccgcctggaggtgaccagggccgaat
gggagcagaaagatgagttcatctgccgtgcagtcctatgaggcagcagccccctcacagacctccagcgagcgggtgtctgtaa
atcccggtaaagcggatccttgaagctcccacctgggccattacctaatctcagtaaatggaattttgtgatgtgcctgacct
actgctttgccccaaagatgcagagagagaaggaggaatgagagattgagaagggaagtgtacgccctgtataaatcgata

30

2e12-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)

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MDFQVQIFSFLISASVIMSRGVDIVLTQSPASLAVSLGQRATISCRASESVEYYVTS
LMQWYQQKPGQPPKLLISAASNVESGVPARFSGSGSGTDFSLNIHPVEEDDIAMYF
CQQSRKVPWTFGGGTKLEIKRGGGSGGGGSGGGGSQVQLKESGPGLVAPSQSLS
ITCTVSGFSLTGYGVNWVRQPPGKLEWLGMWGDGSTDYNSALKSRLSITKDNS
5 KSQVFLKMNSLQDDTARYYCARDGYSNFHYVMDYWGQGTSTVTVSSDHVCSR
DFTPPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTAS
TTQEGELASTQSELTLSQKHWLSDRITYTCQVTYQGHTFEDSTKKCADSNPRGVSA
YLSRPSFDFLIRKSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNG
TLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPEVYAFATP
10 EWPGRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTKSGGFFVFS
RLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGKADPSKLPSWAITLISV
NGIFVICCLTYCFAPRCRERRRNERLRRESVRPV

500A2 scFv (nucleotide sequence)

15 atgttgatacatctcagctccttgggctttactcttctggattcagcctccagaagtacatagtgctgactcagactccagccactc
tgtctctaattcctggagaaagagtcacaatgacctgtaagaccagtcagaatattggcacaatctacactggatcacccaaaacc
aaaggaggtccaagggtctcatcaagtatgcttcgcagtcattcctgggatccctccagattcagtggcagtggtcggaaac
agatttcactctcagcatcaataacctggagcctgatgatcggaaatttactgtcaaaaagtagaagctggcctgtcacgttcg
gtcctggcaccaagctggagataaaacggggtggcggtggctcggcgagggtgggtggcgggatctcaggtcaa
20 gctgcagcagtcgggttgaactagggaaacctggggcctcagtgaactgtcctgcaagacttcaggtacatattcacagatc
actatatcttgggtgaaacagaagcctggagaaagcctgcagtggaatggaatgttatgggaaatgggtgacaagctaca
atcaaaaattccagggaaggccacactgactgtagataaaatcttagcacagcctacatggaactcagcagcctgacatctgag
gattctgccatctattactgtgcaagaaggccggtagcgacgggccatgctatggactactggggtcaggggatccaagttaccgt
ctcctctgac

25

500A2 scFv (amino acid sequence)

MLYTSQLLGLLLFWISASRSDIVLTQTPATLSLIPGERVTMTCKTSQNIGTILHWYH
QKPKEAPRALIKYASQSIPGIPSRFSGSGSETDFTLSINNLEPDDIGIYYCQQSRSWPV
TFGPGTKLEIKRGGGSGGGGSGGGGSQVKLQQSGSELGKPGASVKLSCKTSGYIF
30 TDHYISWVKQKPGESLQWIGNVYGGNGGTSYNQKFQGKATLTVDKISSTAYMEL
SSLTSEDSAIYYCARRPVATGHAMDYWGQGIQVTVSSD

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NT

5' oligo:

Name : IgGWT3

GTTGTTTTCGAAGGATCCGCTTTACCCGGAGACAGGGAGAGGCTCTT

5 NT

3' oligo:

Name : hIgGWT5

GTTGTTAGATCTGGAGCCCAAATCTTGTGACAAAACCTCACACATG

NT

10 5' oligo:

Name : FADD5

Sequence

GTTGTGGATCCTTCGAACCCGTTCTGCTGCTGCTGCACTCGGTGTCG

NT

15 3' oligo:

Name : FADD3

Sequence

GTTGTTATCGATCTCGAGTTATCAGGACGCTTCGGAGGTAGATGCGTC

NT

20 **FADD-CSSCFV (nucleotide sequence)**

gtggatccttgaacccgttctgtgtgctgctgcacitcgggtgtcgtccagcctgtcgagcagcgagctgaccgagctcaagttccta
tgccctcggggcgcgtgggcaagcgcaagctggagcgcgtgcagagcggcctagacctcttccatgctgctggagcagaacga
cctggagcccgggcacaccgagctcctgcgcgagctgctgcctccctgcggcgccacgacctgctgcggcgcgtcgacgact
tcgagggcggggggcggcgccggggccgcgctggggaagaagacctgtgtgcagcatttaacgtcatatgtgataatgtgggg
25 aaagattggagaaggctggctcgtcagctcaaagtctcagacaccaagatcgacagcatcgaggacagataaccccgcaacctg
acagagcgtgtgcgggagtcactgagaatctggaagaacacagagaaggagaacgcaacagtggcccacctgggtgggggctc
tcaggtcctgccagatgaacctgggtggctgacctggtacaagagggtcagcaggcccgtgacctccagaacaggagtggggcca
tgtccccgatgtcatggaactcagacgcactctacctccgaagcgtcctgataactcgagatcgataaacaac

30 **FADD-CSSCFV (amino acid sequence)**

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5

GTTGTGGATCCTCCCTTTTGGGTGCTGGTGGTGGTTGGTGTCTTGGCTTGCTAT
AGCTTG

GTTGTTTCGAACCCAGAAAATAATAAAGGCCACTGTTACTAGCAAGCTATAGC
AAGCCAG

15 GTTGTGGATCCTCCCTTTTGGGGTGCTGGTGGT

GTTGTTTCGAACCCAGAAAAATAATAAAGGCCAC

GTTGTGGATCCTCCTGCTCCCATCCTGG

25 GTTGTTTCGAACGGCAAAGCAGTAGGTCAGGC

GTTGTGGATCCTTCGAACCCATTCCTGGTGCTGCTGCACTCGCTG

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MFADD3XC (nucleotide sequence)

GTTGTTATCGATCTCGAGTCAGGGTGTCTTCTGAGGAAGACAC

- 5 **Murine FADD nucleotide sequence** (full length, but without flanking -Ig or transmembrane sequences) (nucleotide sequence)

gtggatccttgaacatggaccattcctggtgctgctgcactcgtgtccggcagcctgtcgggcaacgatctgatggagctcaa
gtttctgtccgcgagcgcgtgagcaaacgaaagctggagcgcgtgcagagtggcctggacctgttcacgggtgctgctggagca
gaacacctggagcgcgggcacaccgggctgctgcgcgagttgctggcctcgtgcgccgacacgatctactgcagcgcctgg
10 acgacttcgaggcggggacggcgaccgctgcgccccgggggagggcagatctgcaggtggcatttgacattgtgtgtgacaatg
tggggagagactggaaaagactggcccgcgagctgaaggtgtctgaggccaagatggatgggattgaggagaagtacccccg
aagtctgagtgaaggtaaggagagctctgaaagtctggaagaatgctgagaagaagaacgcctcggtggccggactggtca
aggcgctgcggacctgcaggctgaatctggtggctgacctggtggaagaagcccaggaatctgtgagcaagagtgagaatatgt
ccccagtactaagggttaactgtgttctcctcagaaacacctgactcgagatcgat

15

Murine FADD (amino acid sequence)

VDPSNMDPFLVLLHSLSGSLSGNDLMELKFLCRERVSKRKLERVQSGLDLFTVLLE
QNDLERGHTGLLRELLASLRRHDLQRLDDFEAGTATAAPPGEADLQVAFDIVCD
NVGRDWKRLARELKVSEAKMDGIEEKYPRSLSERVRESLKVWKNAEKKNASVA
20 GLVKALRTCRLNLVADLVEEAQESVSKSENMSPVLRDSTVSSSETP

MCASP3-5 (nucleotide sequence)

GTTGTGGATCCTTCGAACATGGAGAACAACAAAACCTCAGTGGATTCA

- 25 **MCASP3-3 (nucleotide sequence)**

GTTGTTATCGATCTCGAGCTAGTGATAAAAGTACAGTTCTTTTCGT

MCASP8-5 (nucleotide sequence)

GTTGTTTCGAACATGGATTTCAGAGTTGTCTTTATGCTATTGCTG

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MCASP8-3 (nucleotide sequence)

GTTGTTATCGATCTCGAGTCATTAGGGAGGGAAGAAGAGCTTCTTCCG

5 **hcasp3-5(nucleotide sequence)**

GTTGTGGATCCTTCGAACATGGAGAACACTGAAAACTCAGTGGAT

hcasp3-3 (nucleotide sequence)

GTTGTTATCGATCTCGAGTTAGTGATAAAAATAGAGTTCTTTTGTGAG

10

hcasp8-5 (nucleotide sequence)

GTTGTGGATCCTTCGAACATGGACTTCAGCAGAAATCTTTATGAT

hcasp8-3 (nucleotide sequence)

15 GTTGTTATCGATGCATGCTCAATCAGAAGGGAAGACAAGTTTTTTTCT

1. 2H7 scFv with alternative VHL11 mutations:

Nucleotide sequence

20 Aagcttgccgccatggatttcaagtcgagatttcagcttctgctaatacagtcgctcagtcataattgccagaggacaaattgtctc
tcccagctcagcaatcctgtctgcatctccaggggagaaggtcacaatgactgcagggccagctcaagtgaagttacatgcac
tggtaccagcagaagccaggatcctcccccacccctggatttatgcccacccaacctggcttctggagtcctgctcgttcagtc
ggcagtggtctgggacctctactcttcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgaggag
ttaaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtgctgggcgggtggtggtatctggaggaggt
gggagctctcaggcttatctacagcagctctggggtgag (one of the following: tcn, acn, gan, can, aan,
25 **egn, agn**)
gtgaggcctggggcctcagtgagatgtcctgcaaggcttctggctacacattaccagttacaatatgcactgggtaaagcagaca
cctagacagggcctggaatggattggagctatttatccaggaaatggtgatacttctacaatcagaagtcaagggaaggccac
actgactgtagacaaaatcctccagcacagcctacatgcagctcagcagcctgacatctgaagactctgcggtctatttctgtgcaag
30 agtggtgtactatagtaactcttactggtacttcgatgtctggggcacagggaccacggtcaccgtctcttctgatcag

30

Amino acid sequence

25 MDFQVQIFSLLISASVIIARGQIVLSQSPAILSPGKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAE (one of the following:
35 **S, T, D, E, Q, N, R, K, H**)
VRPGASVKMSCKASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFK

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GKATLTVDKSSSTAYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVT
VSSDQ

2. VHL11 deletion

5 Nucleotide sequence:

Aagcttgcgcgatggatttcaagtgcagatttcagcttcctgctaatacagtgcttcagtcataattgccagaggacaaattgtctc
tccagctctccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgttaagttacatgcac
tggaccagcagaagccaggatcctccccaaacctggatttatgcccataccaacctggcttctggagtcctctgctcgttcagt
ggcagtggtctgggacctctactctctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgaggag
10 ttaaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtggctcggcggtggtggatctggaggaggt
gggagctctcaggcttatctacagcagctctggggctgaggtgagggcctcagtgaaagatgctcgaaggtctctggct
acacattaccagttacaatatgactgggtaaagcagacacctagacagggcctggaatgattggagctatttatccaggaaatg
gtgatacttctacaatcagaagttcaagggcaagggcacactgactgtagacaaatcctccagcagacgtacatgcagctcagc
agcctgacatctgaagactctgcggtctatttctgtgcaagagtggtgtactatagtaactcttacttggtacttcgatgtctggggcaca
15 gggaccacggtcaccgtctctctgatcag

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
20 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAEVRPGASVKMSCKA
SGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSST
AYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVTVSSDQ

3. 2H7 VL L106 with alternative mutations

25 Nucleotide sequence:

aagcttgcgcgatggatttcaagtgcagatttcagcttcctgctaatacagtgcttcagtcataattgccagaggacaaattgtctc
cccagctctccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgttaagttacatgcact
ggaccagcagaagccaggatcctccccaaacctggatttatgcccataccaacctggcttctggagtcctctgctcgttcagt
gcagtggtctgggacctctactctctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgaggatt
30 taaccacccacgttcggtgctgggaccaagctggag (tcn, agn, aan, cgn, can, gan, and non-natural
derivatives of these codons) aaagatggcgggtggctcggcggtggtggatctggaggaggtgggagctc

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
35 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLE (S, T, R, K, H, Q, N, D, E, and non-natural derivatives of these
amino acids at position 106)KDGGGSGGGGSGGGGSS

4. VL L106 deletion

40 Nucleotide sequence:

Aagcttgcgcgatggatttcaagtgcagatttcagcttcctgctaatacagtgcttcagtcataattgccagaggacaaattgtctc
tccagctctccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgttaagttacatgcac
tggaccagcagaagccaggatcctccccaaacctggatttatgcccataccaacctggcttctggagtcctctgctcgttcagt
ggcagtggtctgggacctctactctctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgaggag
45 ttaaccacccacgttcggtgctgggaccaagctggagaaagatggcgggtggctcggcggtggtggatctggaggaggtgg
gagctc

Amino acid sequence:

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MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLEKDGGGSGGGGSGGGGSS

5 5. IgE CH3 CH4

Nucleotide sequence:

tccaacccgagaggggtgagcgcctacctaagccggccagcccgttcacctgttcacccgaagtcgcccacgatcacctgtc
tggtgggtgacctggcaccagcaaggggaccgtgaacctgacctgggtccggccagtggaagcctgtgaacctccacc
agaaaggaggagaagcagcgcgaatggcacgttaacctgacgtccacctgcccgtgggacccgagactggatcgaggggg
10 agacctaccagtcaggggtgacccacccccacctgcccagggccctcatgcgtccacgaccaagaccagcggcccgctgct
gccccggaagtctatgcgttgcgacggcggagtgccggggagccgggacaagcgcacctcgcctgctgatccagaactt
catgctgaggacatctcgtgcagtggctgcacaacgaggtgcagtcctccggacgcccggcacagcagcagcagccccgc
aagaccaagggtccggcttctgcttccagccgctggaggtgaccagggccgaatgggagcagaagatgagttcatctgcc
gtgcagtcctatgagcagcagacccctcacagaccgtccagcagcgggtgtctgtaaatcccggtaatgataatctagaa

15

Amino acid sequence:

SNPRGVSAYLSRPSPFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTR
KEEKQRNGTLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAA
PEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRK
20 TKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

6. hIgG1H/IgE WCH3 WCH4

Nucleotide sequence:

tgatcaggagcccaaatctctgacaaaactcacacatccccaccgtccccagcatccaacccgagaggggtgagcgcctaccta
25 agccggccagcccgttcacctgttcacccgaagtcgcccacgatcacctgtctgggtggacctggcaccagcaagggg
acctgaacctgacctgggtccggccagtggaagcctgtgaacctccaccagaaaggaggagaagcagcgcgaatggca
cgtaaacgtcacgtccacctgcccgtgggcacccgagactggatcgagggggagacctaccagtcaggggtgacccacccc
cacctgcccagggccctcatgcgtccacgaccaagaccagcggcccgctgctgccccggaagtctatgcgttgcgacgcc
ggagtgccggggagccgggacaagcgcacctcgcctgctgatccagaactcatgctgaggacatctcgggtcagtggt
30 gcacaacgaggtgcagtcctccggacgcccggcacagcagcagcagcagcccgcaagaccaagggtccggcttctcgtctca
gccgctggaggtgaccagggccgaatgggagcagaaagatgagttcatctgccgtgcagtcctatgagcagcagacccctca
cagaccgtccagcagcgggtgtctgtaaatcccggtaatgataatctagaa

Amino acid sequence:

DQEPKSSDKTHTSPPSPASNPRGVSAYLSRPSPFDLFIRKSPTITCLVVDLAPSKGTV
35 NLTWSRASGKPVNHSTRKEEKQRNGTLTVTSTLPVGTRDWIEGETYQCRVTHPHL
PRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLH
NEVQLPDARHSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQT
VQRAVSVNPGK

40

7. IgE WCH2 WCH3 WCH4

Nucleotide sequence:

Tgatcagctctgtccaggacttcacccgcccaccgtgaagatcttacagtcgtcctgcgacggcggcgggacacttcccccg
accatccagctcctgtgctcgtcttggtacacccagggactcaacatcacctggctggaggacgggcaggtcatggacg
45 tggactgtccaccgcctctaccacgcaggaggggtgagctggcctccacaaagcagctcaccctcagccagaagcactggc
tgtcagaccgcacctacacctgccaggtcacctatcaaggtcacaccttgaggacagcaccagaaggtgtgcagattccaaccc
gagaggggtgagcgcctacctaagccggccagcccgttcacctgttcacccgaagtcgcccacgatcacctgtctgggtggtg
gacctggcaccagcaaggggaccgtgaacctgacctgggtccggccagtggaagcctgtgaacctccaccagaaagg
aggagaagcagcgcgaatggcacgttaacctgacgtccacctgcccgtgggcacccgagactggatcgagggggagacctta
ccagtcaggggtgaccacccccacctgcccagggccctcatgcgtccacgaccaagaccagcggcccgctgctgccccg
50 gaagtctatgcgttgcgacggcggagtgccggggagccgggacaagcgcacctcgcctgctgatccagaactcatgct

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gaggacatctcgggtgcagtggctgcacaacgaggtgcagctcccgagcggcgccacagcagcagcagccccgcaagacc
aagggtccggcttctcgtctcagccgcctggaggtgaccaggccgaatgggagcagaaagatgagttcatctgccgtgcag
tccatgaggcagcagccccctcacagaccgtccagcgagcgggtgtctgtaaatcccggtaaatgataatctaga

5 Amino acid sequence:
DHVCSRDFTPPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDV
DLSTASTTQEGELASTQSELTLSQKHWLSDRTYTCQVTYQGHTFEDSTKKCADSN
PRGVSAAYLSRPSFDLFIKRSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKE
EKQRNGTLTVTSTLPVGTDRDIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPE
10 VYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDAHSTTQPRKTK
GSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

8. hIgG1H/IgE CH3 CH4 (ORF)

Nucleotide sequence:

15 tgatcaggagcccaaatctctgacaaaactcacacatccccaccgtccccagcatccaacccgagaggggtgagcgcclaccta
agccggccagcccggttcgacctgttcacccgaagtcgcccacgacacctgtctgggtggacctggcaccagcaagggg
accgtgaacctgacctggctccggggcagtggaagcctgtgaaccactccaccagaaaggaggagaagcagcgcaatggca
cgtaaccgtcacgtccacctgcccgtgggacccgagactggatcgagggggagacctaccagtgcagggtgacctcccc
cacctgcccagggccctcatgctccacgaccaagaccagcggcccgctgtctgccccggaagtctatgctgttcgacgcc
20 ggagtgccggggagccgggacaagcgcacctcgcctgcctgatccagaacttcacctgaggacatctcgtgcagtggt
gcacaacgaggtgcagctcccgagcggcgccacagcagcagcagcagccccgcaagaccaagggctccgcttctcgtctca
gcccctggaggtgaccaggccgaatgggagcagaaagatgagttcatctgccgtgcagtcctgaggcagcagccccca
cagaccgtccagcgagcgggtgtctgtaaatcccggtaaagcgatccttcgaa

25 Amino acid sequence:
DQEPKSSDKTHTSPSPASNPRGVSAAYLSRPSFDLFIKRSPTITCLVVDLAPSKGTV
NLTWSRASGKPVNHSTRKEEKQRNGTLTVTSTLPVGTDRDIEGETYQCRVTHPHL
PRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLH
NEVQLPDAHSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQT
30 VQRAVSVNPGKSGSFE

9. 2H7 VHL11S scFv hIgG1(SSS-S)H hIgE WCH3 WCH4

Nucleotide sequence:

35 aagcttcccgcattgatttcaagtgcagatttcagcttcctgctaatacagtgcttcagtcataattgccagaggacaaattgtctct
cccagctccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgttaagtacatgcact
ggtaccagcagaagccaggatctccccaaacctggatttatccccatccaacctggcttctggagtcctctgctcgttcagtg
gcagtggtgtcgggacctcttactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgaggtt
taaccacccacggttcggtgctgggaccaagctggagctgaagatggcgggtgctcggcggtggtgagtgagtg
ggagctctcaggcttatctacagcagctctggggctgagtcggtgaggcctggggcctcagtggaagatgctcgaaggcttctggc
40 tacacattaccagttacaatatgactgggtaaacgagacacctagacagggcctggaatggattggagctatttatccaggaat
ggtgatacttctacaatcagaagttaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctatttctgtgcaagagtgggtgactatagtaacttactggctactcagatgctggggc
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cgagaggggtgagcgcctacctaagccggccagccggttcgacctgttcacccaagtcgccacagatcacctgtctggtggt
45 ggacctggcaccagcaaggggacctgaacctgacctggctccggggcagtggaagcctgtgaaccactccaccagaag
gaggagaagcagcgcaatggcacgttaacctgacgtccacctgccggtgggacccgagactggatcagggggagacct
accagtgcagggtgaccacccccacctgccaggggccctcatgctggtccacgaccaagaccagcggccgcgtgctgcccc
ggaagtctatgctgttcgacgccggagtggccggggagccgggacaagcaccctgcctgcctgatccagaacttcagcc
tgaggacatctcgtgcagtggtgcacaacgaggtgcagctcccgagcggcgccacagcagcagcagccccgaagacc
50 aagggtccggcttctcgtctcagccgcctggaggtgaccaggccgaatgggagcagaaagatgagttcatctgccgtgcag
tccatgaggcagcagccccctcacagaccgtccagcgagcgggtgtctgtaaatcccggtaaatgataatctaga

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Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 5 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
 TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
 THTSPSSASNPRGVSAYLSRPSFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASG
 KPVNHSTRKEEKQRNGTLTVTSTLPVGTTRDWIEGETYQCRVTHPHLPRALMRSTT
 10 KTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDAR
 HSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNP
 GK

10. 2H7 VHL11S scFv hIgG1(SSS-P)H hIgE WCH3 WCH4

15

Nucleotide sequence:

aagcttgcgccatggaatttcaagtgcagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
 cccagctctccagcaatcctgtctgcattccaggaggagaggtcacaatgacttgcaggggccagctcaagtgttaattacatgcact
 ggtaccagcagaagccaggatcctccccaacccctggatttatccccaatcaacctggcttctggagtcctgtcgtctcagtg
 20 gcagtgggtctgggacctctactctcacaatcagcagagtgagggtgaagatgctgccatttactgccagcagtgagggtt
 taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtggctcggcggtggtggatctggaggaggtg
 ggagctctcaggcttatctacagcagctggtgggtgagtcggtgaggcctggggcctcagtgaaatgtctgcaaggcttctggc
 tacacatttaccagttacaatatgcactgggtaagcagacacctagacaggcctggaatggattggagctatttatccaggaaat
 ggtgatacttctacaatcagaagttcaaggcgaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
 25 cagcctgacatctgaagactctgcggtctatttctgtcaagagtggtgactatagtaactcttactggctactcagtgctggggcac
 agggaccacggtcaccgtctcttctgatcaggagcccaatcttctgacaaaactcacacatccccaccgtccccagcatccaacc
 cgagagggggtgagcgctacctaagccggccagccggttcgacctgttcacccgaagtcgccacgatcacctgtctggtggg
 ggacctggcaccagcaaggggaccgtgaacctgacctggtccgggagtggaagcctgtgaaccactccaccagaaag
 gaggagaagcagcgcaatggcacgttaacctgcacgtccacctgcccgtgggacccgagactggatcgagggggagacct
 30 accagtgcagggtgacccacccacacctgcccaggggccctcatgctgggtccacgaccaagaccagcggcccgctgctgcccc
 ggaagtctatgcgttgcgacgccggagtgccggggagccgggacaagcgcaccctcgctgctgatccagaacttcatgcc
 tgaggacatctcgggtgagtggtgcacaacgaggtgcagctccgggacggcgacagcacgacgcagccccgaagacc
 aagggtcccgcttctctctcagccgctggaggtgaccaggggcgaatgggagcagaagatgagttcatctgccgtgcag
 tccatgaggcagcgagccctcacagaccgtccagcgagcggtgtctgtaaatcccggttaaatgataatctaga

35

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 40 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
 TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
 THTSPSPASNPRGVSAYLSRPSFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASG
 KPVNHSTRKEEKQRNGTLTVTSTLPVGTTRDWIEGETYQCRVTHPHLPRALMRSTT
 KTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDAR
 45 HSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNP
 GK

10. 2H7 VL L106S

aagcttgcgccatggaatttcaagtgcagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
 50 cccagctctccagcaatcctgtctgcattccaggaggagaggtcacaatgacttgcaggggccagctcaagtgttaattacatgcact
 ggtaccagcagaagccaggatcctccccaacccctggatttatccccaatcaacctggcttctggagtcctgtcgtctcagtg

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gcagtgggtctgggacctcttactcttcacaatcagcagagtggaggtgaagatgctgccacttattactgccagcagtgaggtt
taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtggctcggcggtggtgagctggaggaggtg
ggagctc

5 Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGGSGGGGSGGGGSS

10 11. 2H7 VL L106S scFv

Nucleotide sequence:

aaagcttggcccatgatttcaagtgcagatttcagcttctgtaatacagtgcttcagtcataattgccagaggacaaattgttctc
cccagcttccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagttaagttacatgcact
gggtaccagcagaagccaggatcctccccaaccctggatttatgccccatccaacctggcttctggagtcctctgctcgttcagtg
15 gcagtgggtctgggaccttactcttcacaatcagcagagtggaggtgaagatgctgccacttattactgccagcagtgaggtt
taaccacccacgttcggtgctgggaccaagctggagcttaagatggcgggtggctcggcggtggtgagctggaggaggtg
ggagctctcaggttatctacagcagctctggggctgagctggtgaggcctggggcctcagtgaaatgctcgaaggcttctggc
tacacattaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
gggtgatacttctacaatcagaagtcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
20 cagcctgacatctgaagactctgcggtctatttctgtgcaagagtgggtgactatagtaactcttactggtacttcgatgtctggggc
agggaccacggtcaccgtctcttctgatcag

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
25 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGGSGGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVTVSSDQ

30 12. 2H7 scFv VL L106S VHL11S scFv

Nucleotide sequence:

Aagcttggcccatgatttcaagtgcagatttcagcttctgtaatacagtgcttcagtcataattgccagaggacaaattgttctc
tcccagcttccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagttaagttacatgcac
tggtaccagcagaagccaggatcctccccaaccctggatttatgccccatccaacctggcttctggagtcctctgctcgttcagtg
35 ggcagtggtctgggaccttactcttcacaatcagcagagtggaggtgaagatgctgccacttattactgccagcagtgaggt
ttaaccacccacgttcggtgctgggaccaagctggagcttaagatggcgggtggctcggcggtggtgagctggaggaggt
gggagctctcaggttatctacagcagctctggggctgagctggtgaggcctggggcctcagtgaaatgctcgaaggcttctg
gctacacattaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaa
atgggtgatacttctacaatcagaagtcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctc
40 agcagcctgacatctgaagactctgcggtctatttctgtgcaagagtgggtgactatagtaactcttactggtacttcgatgtctggggc
acagggaccacggtcaccgtctcttctgatcag

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
45 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVTVSSDQ

50 10. Human IgD hinge linker with attached restriction sites

Nucleotide:

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PCT/US2003/041600

gtggatccaggttcgaagtctccaaaggcacaggcctcctccgtgccactgcacaacccccagcagagggcagcctcgccaa
ggcaaccacagccccagccaccaccgtaacacaggaagaggaggagaagagaagaagaaggagaaggagaagaggaa
caagaagagagagacaaagaccggcgagtcgacg

5 Amino acid:
VDPGSKSPKAQASSVPTAQPQAEGSLAKATTAPATTRNTGRGGEEKKKKEKEKEEQ
EERETKTGAVD

Sequence of Native IgD hinge domain:

10 (includes a cysteine residue—we truncated the hinge prior to that residue for these
constructs:)

Nucleotide:

gagtcctccaaaggcacaggcctcctccgtgccactgcacaacccccagcagagggcagcctcgccaaggcaaccacagccc
cagccaccaccgtaacacaggaagaggaggagaagagaagaagaaggagaaggagaagaggacaagaagagagaga
15 gacaaagacaccagagtgctcgagccacaccagcctcttgccgctctacctgctaaccct

Amino acid sequence:

ESPKAQASSVPTAQPQAEGSLAKATTAPATTRNTGRGGEEKKKKEKEKEEQEERET
KTPECPSHTQPLGVYLLTP

20

12. 2H7 VH L11S

Nucleotide sequence:

caggcttatctacagcagtcctggggctgagtcggtagggcctggggcctcagtgaaatgtcctgcaaggctctggtacacattt
accagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaatggatgatact
25 tctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcagcagcctga
catctgaagactctgcggtctattctgtgcaagagtgggtactatagtaactcttactggctcctgatgtctggggcacaggagacc
acggtcaccgtctctct

Amino acid sequence:

30 QAYLQQSGAESVRPGASVKMSCKASGYTFTSYNMHWVKQTPRQGLEWIGATYPG
NGDTSYNQKFKGKATLTVDKSSSTAYMQLSSLTSEDSAVYFCARVVYYNSYWY
FDVWGTGTTVTVSS

13. 2H7 VH L11S scFv

35 Nucleotide sequence:

aagcttccgccatggatttcaagtcagatttcagcttcctgctaatacagtcgctcagtcataattgccagaggacaaattgtctct
cccagctcagcaatcctgtctgcactcaggggagaaggtcacaatgacttcagggccagctcaagtgaattacatgcact
ggtaccagcagaagccagatcctccccaacccctggatttatcccatccaacctggctctggagtcctgctcgttcagtg
gcagtggtgtctgggacctcttactctcacaatcagcagagtgaggctgaagatgtgccacttattactgccagcagtgagatt
40 taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcggctggctcggcggtggtggtatcgaggagggtg
ggagctctcaggcttatctacagcagtcctgggctgagtcggtgaggcctggggcctcagtgaaatgtcctgcaaggctctggtc
tacacattaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
gggtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctattctgtgcaagagtgggtactatagtaactcttactggctactgatgtctggggcac
45 agggaccacggtcaccgtctctctgatcag

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSPSPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
50 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK

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PCT/US2003/041600

ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQ

14. 2H7 scFv VH L11S hIgG1 (CSC-S)H WCH2 WCH3

- 5 Nucleotide sequence:
aagcttgccgccatggatttcaagtcagatttcagcttctgctaatactgcttcagtcataattgccagaggacaaattgttctct
cccagctccagcaatcctgtctgcatctccaggggagaaaggtcacaaatgacttcagggccagctcaagtgttaagttacatgcact
ggtaccagcagaagccaggatcctcccccaccctggatttatgccccatccaacctggcttctggagtcctgctcgttcagtg
gcagtggtgtctggaccttactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgaggttt
10 taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtgctcggcggtggtggtgagctggaggagtg
ggagctctcaggcttatctacagcagcttggggctgagctgtgaggcctggggcctcagtgaaagtgctcgaaggcttctggt
acacatttaccagttacaatatgcaactgggtaaaagcagacacctagacagggcctggaatggattggagctattatccaggaaatg
gtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcagacctacatgcagctcagc
agcctgacatctgaagactctcggtctatttctgtgcaagagtggtgtactatagtaactcttactggtacltctgatgtctggggcaca
15 gggaccacggtcaccgtctctctgatcaggagcccaaatctgtgacaaaactcacacatctccaccgtgctcagcacctgaactc
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cgcgggaggagcagtagaacagcagctaccgtgtgtgacgctcctcaccgtctcagcaggactggctgaatggcaaggag
tacaagtgcaggtctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
20 acaggtgtacacctgccccatcccggtatgagctgaccaagaaccaggtcagcctgacctgctgctcaaaagcttctatcca
agcgacatcgccgtggagtgaggagcaatgggcagccggagacaactacaagaccagcctcccggtgctggactccgacg
gctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctcctgatgatgag
gctctgcacaaccactacagcagaagagcctctcctgtctccgggtaaatgatctaga
- 25 Amino acid sequence:
MDFQVQIFSLLISASVILARGQIVLSOSPAILASAPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
30 TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQEPKSCDK
THTSPPCSAPPELLGPSVFLFPPKPKDITLMISRTPTEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSQVMHEALHNHYTQKSLSL
35 SPGK

15. 2H7 scFv VH L11S IgE WCH2 WCH3 WCH4

- Nucleotide sequence:
aagcttgccgccatggatttcaagtcagatttcagcttctgctaatactgcttcagtcataattgccagaggacaaattgttctct
40 cccagctccagcaatcctgtctgcatctccaggggagaaaggtcacaaatgacttcagggccagctcaagtgttaagttacatgcact
ggtaccagcagaagccaggatcctcccccaccctggatttatgccccatccaacctggcttctggagtcctgctcgttcagtg
gcagtggtgtctggaccttactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgaggttt
taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtgctcggcggtggtggtgagctggaggagtg
ggagctctcaggcttatctacagcagcttggggctgagctgtgaggcctggggcctcagtgaaagtgctcgaaggcttctggt
45 acacatttaccagttacaatatgcaactgggtaaaagcagacacctagacagggcctggaatggattggagctattatccaggaaatg
gtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcagacctacatgcagctcagc
agcctgacatctgaagactctcggtctatttctgtgcaagagtggtgtactatagtaactcttactggtacltctgatgtctggggcaca
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ggcggcgggacttccccccaccatccagctcctgtgcctcgtctctgggtacacccagggactatcaacatcacctggctgg
50 aggacgggcaggtcatggacgtggactgtccaccgctctaccacgcaggagggtgagctggcctccacacaaagcagctc
acctcagccagaagcactggctgtcagaccgacctacacctgccaggtcacctatcaaggtcacaccttgaggacagcacca

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agaagtgtgcagattccaacccgagaggggtgagcgctacctaagccggcccagcccgttcacgtgttcacgcaagtcgc
ccacgatcacctgtctgggtgggacctggcaccagcaaggggaccgtgaacctgacctgggtccggggccagtgggaagcct
gtgaaccactccaccagaaaggaggagaagcagcgcaatggcacgtaaacgtcacgtccaccctgccgggtgggcacccgag
actggatcgagggggagacctaccagtgcaggggtgaccacccccacctgcccagggccctcatgagggtccacgaccaagac
5 cagcgcccccgcgtgctgccccggaagtctatgcgtttgcgacgcccggagtgccgggggagccgggacaaagcgcaccctcgcc
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acgacgcagccccgcaagaccaagggtccggcttctcgtcttcagccgctggaggtgaccagggccgaatgggagcagaa
agatgagttcatctgcccgtgcagtcctagggcagcgagccctcacagaccgtccagcgagcggtgtctgtaaatcccggtaaa
tgataatctaga

10

Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
15 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTTVTVSSDHVCSRDF
PPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTASTTQ
EGELASTQSELTLSQKHWSLDRITYTCQVTYQGHTFEDSTKKCADSNPRGVSAYLS
RPSFDLFIKRSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNGTLT
20 VTSTLPVGTDRDIEGETYQCRVTHPLRALMRSTTKTSGPRAAPEVYAFATPEW
PGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFSRL
EVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

16. 2H7 scFv VH L11S mIgE WCH2 WCH3 WCH4

25 Nucleotide sequence:

aagcttgcgccatggatttcaagtgcagatttcagcttcctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagctccagcaatcctgtctgcatctccaggggagaaggtcacatgactgcagggccagctcaagtgaagtacatgcact
ggtagcagcagaagccaggtacctccccaaacctggattatgccccatcaacctggctctgagtcctctgctcgttcagtg
gcagtggtctgggacctcttactcttcacaatcagcagagtgaggagctgaagatgctgccattattactgccagcagtgaggtt
30 taaccacccacgttcgtgctgggaccaagctggagctgaaagatggcgggtggctcggcggtgggtgagctggaggagtg
ggagctctcaggttatctacagcagctggggctgagctgtgaggcctggggcctcagtgaaagatgctctgcaaggcttctggct
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gtgatacttctacaatcagaagttcaagggaagggcacactgactgtagacaaatcctccagcacagcctacatgcagctcagc
agcctgacatctgaagactctgcgtctatttctgtgcaagagtgggtgactatagtaactcttactggtacttcgatgtctggggcaca
35 gggaccacggtcaccgtctctctgacacgttcgacctgtcaacatcactgagcccaccttgagctactccattcatcctgcgacc
ccaatgcattccactccaccatccagctgtactgtcttattatggccacatcctaataatgatgtctctgtcagctggctaattggacgatc
gggagataactgatacacttgacaaaactgttctaatacaggaggaaggcaactagcctctacctgcagtaaaactcaacatcactg
agcagcaatggatgtctgaaagcaccctcacctgcaaggtcacctcccaaggcgtagactattggccacactcgagatgccc
gatcatgagccacggggtgtgattacctacctgatccaccagccccctggacctgtatcaaaacgggtgtcccaagcttacctgt
40 ctggtggtggacctggaaagcgagaagaatgtcaatgtgacgtggaaccaagagaagaagacttcagctcagcatccagtggt
acactaagcaccacaataacgccacaactagatcacctccatcctgcctgtagttgccaaggactggattgaaggctacggctatc
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gtgcagtggtgggggatggcaactgatctcaaacgccagcagcagtagccacacacccctgaaatccaatggctccaatcaa
45 ggcttcttcatcttcagtcgcttagaggtcgccaagacactctggacacagagaaaacagttcacctgccaagtgtccatgaggc
acttcagaaacccaggaaactggagaaaacaatatccacaagccttggtaacacctccctccgtccatcctagtaatactagag

Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
50 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK

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ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDHVRPVNIT
EPTLELLHSSCDPNAFHSTIQLYCFIYGHILNDVSVSWLMDDREITDTLAQTVLIKE
EGKLASTCSKLNITEQQWMSESTFTCKVTSQGVVDYLAHTRRCPDHEPRGVITYLIP
5 PSPLDLYQNGAPKLTCLVVDLESEKNVNVVTWNQEKKTSVSASQWYTKHHNNATT
SITSILPVVAKDWIEGYGYQCIVDHPDFPKPIVRSITKTPGQRSAPENVYVFPPEESEE
DKRTLTLCLIQNFFPEDISVQWLGDGKLISNSQHSTTTPLKSNQNGFFIFSRLEVAK
TLWTQRKQFTCQVIHEALQKPRKLEKTISTSLGNTSLRPS

10 **17. 2H7 scFv VH L11S hIgA WH WCH2 T4CH3**

Nucleotide sequence:

aagcttgccgccatggatttcaagtcagatttcagcttctgctaatacagtcgttcagtcataattgccagaggacaaattgttctct
cccagctccagcaatcctgtctgcatctccaggggagaaaggtcacatgactgcagggccagctcaagtgtaagtacatgcact
ggtagcagcagaagccaggatcctcccccacccctggatttatgccccatccaacctggcttctggagtcctctgctcgttcagtg
15 gcagtggtctgggaccttactctctcacaatcagcagagtgaggagctgaagatgctgccacttattactgccagcagtgagattt
taaccacccacggtcgggtctgggaccaagctggagctgaaagatggcgggtgctcgggcgggtggatctggaggagtg
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gtgatacttctacaatcagaagttcaagggaagccacactgactgtagacaaatcctccagcacagcctacatgcagctcagc
20 agcctgacatctgaagactctgcggctctatttctgtgcaagagtggtgactatagtaactcttactgtacttcgatgtctgggacaca
gggaccacggtcaccgtctctctgatcagccagttccctcaactccacctacccatctccctcaactccacctacccatctccct
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25 gcttaccggagtcgaagaccccgtaaccgccacctctcaaaatccggaaacacattccggcccagggtccacctgctgccg
ccggcctcggaggagctggccctgaacgagctggtgacgctgacgtgcctggcacgtggcttcagccccagagatgtgtgtgtt
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ccaccttcgctgtgaccagcactgctgcgtggcagccgaggactggaagaagggggacaccttctctgcatggtgggcccacg
aggccctgccgctggccttcacacagaagaccatcgaccgcttggcgggtaaacccaccatgtcaatgtgtctgttgcacgtggcg
30 gagtggtgactgataatctaga

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
35 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQVPVSTPPT
PSPSTPPTPSPSCCHPRLSLHRPALEDLLLGSEAILTCTLTGLRDASGVITFTWTPSSG
KSAVQGGPPDRDLGCGYSVSSVLPGCAEPWNHKGKTFCTAAYPESKTPLTATLSKS
40 GNTFRPEVHLLPPPSEELALNELVTLTCLARGFSPKDVLRWLQGSQELPREKYLT
WASRQEPSQGTTFFAVTSILRVAEDWKKGDTFSCMVGHEALPLAFTQKTIDRLA
GKPTHVNVSVVMAEVD

18. 2H7 scFv VH L11S mIgA WH WCH2 T4 CH3

45 Nucleotide sequence:

aagcttgccgccatggatttcaagtcagatttcagcttctgctaatacagtcgttcagtcataattgccagaggacaaattgttctct
cccagctccagcaatcctgtctgcatctccaggggagaaaggtcacatgactgcagggccagctcaagtgtaagtacatgcact
ggtagcagcagaagccaggatcctcccccacccctggatttatgccccatccaacctggcttctggagtcctctgctcgttcagtg
gcagtggtctgggaccttactctctcacaatcagcagagtgaggagctgaagatgctgccacttattactgccagcagtgagattt
50 taaccacccacggtcgggtctgggaccaagctggagctgaaagatggcgggtggctcgggcgggtggatctggaggaggtg
ggagctctcaggcttatctacagcagctctggggctgagctctgaggcctggggcctcagtgaaatgctctgcaaggcttctggct

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acacatttaccagttacaatatgcactgggtaaagcagacacctagacaggcctggaatggattggagctatttatccaggaaatg
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agcctgacatctgaagactctcggtctatttctgtgcaagagtgggtactatagtaactcttactggtactctgatgtctggggcaca
gggaccacggtcaccgtctctctgatcacatctgttctcctactactcctcctccaccttctgccagcccagcctgtcactgca
5 gcggccagctcttgaggacctgtcctgggttcagatgccagcatcacatgtactctgaatggcctgagagatcctgagggagctg
tcttcacctgggagccctccactgggaaggatgcagtgacagaagaagctgtgcagaattcctcggtctgacagtggtccagc
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ctcgtgtccctgacatgctgtgagcgtttcaaccctaaagaagtgtggtgcgatggctgcatggaatgaggagctgtcccc
10 agaaagctacctagtgtttgagcccctaaaggagccagggcagggagccaccacctacctggtgacaagcgtgtgcgtgtatca
gctgaaatctggaacagggtgaccagtactcctgcatggtgggccacgagcccttgcctgaacttcaccacagaagaccatcg
accgtctgtcgggtaaaccaccaatgtcagcgtgtctgtgatcatgtcagaggagattgataatctagat

Amino acid sequence:

15 MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTISYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDHICSPPTTP
20 PPPSCQPSLSLQRPALDLLLLGSDASITCTLNGLRDPEGAVFTWEPSTGKDAVQKK
AVQNSCGCYSVSSVLPGCAERWNSGASFKCTVTHPESDTLTGTLAKVTVNTFPPQV
HLLPPPSEELALNELVSLTCLVRAFNPKEVLVRWLHGNEELSPESYLVEPLKEPGE
GATTYLVTSVLRVSAEIWKQGDQYSCMVGHEALPMNFTQKTIDRLSGKPTNVSVS
VIMSEGD

25

A. mIgA WCH2 T4CH3

Nucleotide sequence:

Gttgtgatcacatctgttctcctactactcctcctccaccttctgccagcccagcctgtcactgcagcggccagctcttgagga
cctgtcctctgggttcagatgccagcatcacatgtactctgaatggcctgagagatcctgagggagctgtcttcacctgggagccctc
30 cactgggaaggatgcagtgacagaagaagctgtgcagaattcctcggtctgacagtggtccagcgtcctgcctgctgtgtg
agcgtctggaacagtggcgcatcattcaagtgcacagttaccatcctgagctgtacaccttaactggcacaattgccaaagtcaca
gtgaacaccttcccaccccaggtccacctgtaccgccgccgtcggaggagctggccctgaatgagctcgtgtccctgacatgcc
tggtgcgagctttcaaccctaaagaagtgtgtgcatggtgcatggaatgaggagctgtccccagaaagctacctagtgtttg
agcccctaaaggagccagggcagggagccaccacctacctggtgacaagcgtgtgtgcatcagctgaaatctggaacagg
35 gtgaccagtactcctgcatggtgggccacgagcccttgcctgaacttcaccacagaagaccatcgaccgtctgtcgggtaaac
cacaatgtcagcgtgtctgtgatcatgtcagaggagattgataatctagat

Amino acid sequence:

40 DHICSPPTTPPPSCQPSLSLQRPALDLLLLGSDASITCTLNGLRDPEGAVFTWEPST
GKDAVQKKAVQNSCGCYSVSSVLPGCAERWNSGASFKCTVTHPESDTLTGTLAKV
TVNTFPPQVHLLPPPSEELALNELVSLTCLVRAFNPKEVLVRWLHGNEELSPESYL
VFEPLKEPGE GATTYLVTSVLRVSAEIWKQGDQYSCMVGHEALPMNFTQKTIDRL
SGKPTNVSVSVIMSEGD

45 20. K322S CH2 region

Nucleotide sequence:

cctgaactcctgggggaccgtcagttcttcttccccccaaacccaaggacacctcatgatctcccggaccctgaggtcac
atgcgtgggtggagctgagccacgaagacctgaggtcaagttaactgggtacgtggacggcgtggaggtgcataatgcaa
gacaaagccgaggaggagcagtagaacagcacgtaccgtgtgtgcatgcgtcaccgtcctgcaccaggactggctgaatg
50 gcaaggagtacaagtgtcgtgtcctcaacaaagccctccagccccatcgagaaaacaatctccaaagccaaa

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Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCSVSNKALPAPIEKTISKAK

5

21. K322S CH2 WCH3

Nucleotide sequence:

cctgaactcctgggggaccgtcagtccttcttcccccaaaacccaaggacaccctcatgatctccggaccctgaggtcac
atgcgtggtggtggacgtgagccacgaagaccctgaggtcaagttcaactgtacgtggacggcgtggaggtgcataatgccaa
10 gacaaagccgcgggaggagcagtacaacagcacgtaccgtgtgtcagcgtcctcaccgtcctgcaccaggactggctgaatg
gcaaggagtacaagtgtcgtcgtcctcaacaaagccctccagccccatcgagaaaacaatctcaaaagccaaaggcagccc
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15 atgcatgaggtctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCSVSNKALPAPIEKTISKAKG
20 QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPV
LDS DGSFFLYSKLTVDKSRWQQGNV FSCSV MHEALHNHYTQKSLSLSPGK

1. K322L CH2 WCH3

Nucleotide sequence:

tgatcaggagcccaaatctctgacaaaactcacacatccccaccgtcctcagcacctgaactcctggggggaccgtcagtccttct
cttcccccaaaacccaaggacaccctcatgatctccggaccctgaggtcacatgcgtggtggtggacgtgagccacgaaga
ccctgaggtcaagttcaactgtgtacgtggacggcgtggaggtgcataatgccaaagacaaagccgcgggaggagcagtaaca
gcacgtaccgtgtgtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaaggagtacaagtgcctggtctccaaca
agccctccagcctccatcgagaaaacaatctcaaaagccaaaggcagccccgagaaccacaggtgtacacctgccccat
30 cccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcaaaaggcttctatccagcgacatcgccgtggagtggtg
agagcaatgggcagccggagaacaactacaagaccacgcctcccggtgtgactccgacggctccttctctctacagcaagct
caccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgaggtctgcacaaccactacacgca
gaagagcctctcctgtctccgggtaaatgatctaga

35 Amino acid sequence:

DQEPKSSDKTHTSPPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHED
PEVKFNWYVDGVEVHN AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCLV
SNKALPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVE
WESNGQPENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNV FSCSV MHEALHN
40 HYTQKSLSLSPGK

22. 2H7 scFv VHL11S hIgG1 (SSS-S)H K322SCH2 WCH3

Nucleotide sequence:

aagcttgcgccatggatttcaagtcagatttgcagtccttctgtaatacgtgttcagtcataattgccagaggacaaattgttctt
45 cccagctctccagcaatcctgtctgcatctccaggggagaaaggtcacatgaactgcagggccagctcaagtgttaattacatgcact
ggtaccagcagaagccaggatcctccccaaacctggatttatccccatccaacctggcttctggagtcctgtcgttcagtg
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ggagctctcaggttatctacagcagctgtgggctgagtcggtgaggcctggggcctcagtgaaagatgctcgaaggcttctggc
50 tacacatttaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
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PCT/US2003/041600

cagcctgacatctgaagactctcggtctatttctgtgcaagagtgggtgactatagtaactcttactggacttcgatgtctggggcac
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ctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgagg
10 cttgcacaaccactacacgcagaagagccctcctctgtcctgggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
15 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCSVSNKALPAPIE
20 KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSSVMHEALHNHYTQKSLSLS
PGK

23. 2H7 scFv VHL11S hIgG1 (SSS-S)H K322LCH2 WCH3

Nucleotide sequence:

aagcttgccgcatggatttcaagtgcagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagctccagcaaatctgtctgcatctccaggggagaagggtcacaatgactgcagggccagctcaagtgaattacatgcact
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30 gcagtggtgtctgggaccttctactcttcacaatcagcagagtgaggagctgaagatgctgcccatttactgccagcagtgaggatt
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45

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
50 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQEPKSSDK

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24. 2H7 scFv VHL11S hIgG1 (CSS-S)H K322SCH2 WCH3

aaagcttgcgcgcacatggattttcaagtgacagattttcagcttctctgctaatacagtgcttcagtcataattgccagaggacaaattgtctct
10 cccagcttccagcaatctctgtctgcatctccaggggagaaaggtcacaaatgacttgcaggggccagctcaagtgtaagttacatgcact
ggtaccagcagaagccagatctctcccccaccctggatttatgccccatccaacctggcttctggagtcctgctcgcttcagtg
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cgcgggaggagcagtagaacagcacgtaccgtgtgtgcagcgtcctcaccgtcctgcaccaggactgggtgaatggcaaggag
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caggtgtacacctgcccccatccgggatgagctgaccaagaaccagggtcagcctgacctgcctgggtcaaaaggcttctatcca
25 gcgacatgcgcgtggagtgaggagagcaatgggcagccggagaacaactlacaagaccacgcctccgtgctggactccgacgg
ctctcttctctctacagcaagctcaccgttgacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgagg
ctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

30
35

MD FQ V Q I F S F L L I S A S V I I A R G Q I V L S Q S P A I L S A S P G E K V T M T C R A S S S V S Y M H W Y
Q Q K P G S S P K P W I Y A P S N L A S G V P A R F S G S G S G T S Y S L T I S R V E A E D A A T Y Y C Q Q W S
F N P P T F G A G T K L E L K D G G S G G G G S G G G G S S Q A Y L Q Q S G A E S V R P G A S V K M S C K
A S G Y T F T S Y N M H W V K Q T P R Q G L E W I G A I Y P G N G D T S Y N Q K F K G K A T L T V D K S S S
T A Y M Q L S S L T S E D S A V Y F C A R V V Y Y S N S Y W Y F D V W G T G T T V T V S S D Q E P K S C D K
T H T S P P S S A P E L L G G P S V F L F P P K P K D T L M I S R T P E V T C V V V D V S H E D P E V K F N W Y V
D G V E V H N A K T K P R E E Q Y N S T Y R V V S V L T V L H Q D W L N G K E Y K C S V S N K A L P A P I E
K T I S K A K G Q P R E P Q V Y T L P P S R D E L T K N Q V S L T C L V K G F Y P S D I A V E W E S N G Q P E N
N Y K T I P P V L D S D G S F F L Y S K L T V D K S R W Q Q G N V F S C S V M H E A L H N H Y T Q K S L S L S
P G K

45 cctgaactcctgggggggaccgtcagtcctctctcccccacaaacccaaggacaccctcatgatctccggacccctgaggtcac
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gacaagaagccgcggaggagcagtcacaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatg
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50

375

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Nucleotide sequence:

cctgaactcctgggggaccgtcagttcttcttcccccaaaacccaaggacaccctcatgatctcccgaccctgaggtcac
atgcgtggtggtggacgtgagccacgaagaccctgaggtcaagttaactggtacgtggacggcgtggaggtgcataatgcaa
gacaaagccgcgggaggagcagtacaacagcagctaccgtgtgtgcagcgtcctaccgtcctgcaccaggactggctgaatg
5 gcaaggagtacaagtgcgaaggtctccaacaagccctccagcctcatcgagaaaacaatctcaaagccaaagggcagccc
cgagaaccacaggtgtacaccctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgacctggtcaaagg
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actccgacggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtg
atgcatgaggtctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

10

Amino acid sequence

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPASIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPV
15 LDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

27. 2H7 scFv VH L11S (SSS-S)H P331S CH2 WCH3

Nucleotide sequence:

aagcttgcgcctgatttcaagtcagatttctcagcttctgctaatcagtgcttcagtcataattgccagaggacaaattgtctct
20 cccagctcctcagcaatcctgtctgcatctccaggggagaagggtcacaatgactgcagggccagctcaagtgtaatgtacatgcact
ggtaccagcagaagccaggtatcctccccaaacctggaattatgccccatcaacctggcttctggagtcctgctcgttcagtg
gcagtggtgtctgggaccttactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgagttt
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ggagctctcaggcttatctacagcagcttggggctgagtcgggtgaggcctggggcctcagtgaaagatgctcgaagccttctggc
25 tacacatttaccagttacaatatgactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaat
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35 ctcttcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgagg
ctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

40

Amino acid sequence

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
40 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWFYFDVWGTGTTTVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
45 DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPASIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPN
NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLS
PGK

50

28. 2H7 scFv VH L11S (CSS-S)H P331S CH2 WCH3

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PCT/US2003/041600

Nucleotide sequence:

aagcttggcccatggatttcaagtcagattttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgtctct
cccagctctccagcaatctgtctgcatctccaggggagaaggtcacatgacttgcagggccagctcaagtgtaagtacatgcact
ggtagcagcagaagccaggatctctcccccacccctggatttatgccccatccaacctggcttctggagtcctctgctcgttcagt
5 gtagtgggtctgggaccttactctctcacatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgagttt
taaccacccacgttcgggtgctgggaccaagctggagctgaaagatggcgggtggctcggcggtgggtgagctggaggagtg
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tacacattaccagttacaatatgcactgggtaagcagacacctagacaggcctggaatggattggagctatttatccaggaaat
ggtgatacttctacaatcagaagtcaaggccaaggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
10 cagcctgacatctgaagactctgcggctatttctgtgcaagagtggtgactatagtaacttactggtacttctgatctctgggcac
agggaccacgggtcaccgtctctctgatcaggagcccaatctgtgacaaaactcacacatccccaccgtctcagcactgaact
cctggggggaccgtcagcttctctctccccccaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtgg
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cgcgaggaggagcagtagaacagcagtagcctgtggtagcgtcctaccgtcctgcaccaggactgggtgaatggcaaggag
15 tacaagtgaaggtctccaacaagccctccagcctccatcgagaaaacaatctccaagccaaagggcagccccgagaacca
caggtgtacacctgcccccatcccggtgagctgaccaagaaccaggtcagcctgacctgctgcaaggcttctatcca
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ctcttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctcctgatgcagtagg
ctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

20

Amino acid sequence

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
25 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTTVTVSSDQEPKSCDK
THTSPSSAPELGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPASEI
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
30 NYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFSQVMHEALHNHYTQKSLSLS
PGK

29. T256N CH2 region

Nucleotide sequence:

Cctgaactcctggggggaccgtcagttctctctccccccaaacccaaggacacctcatgatctcccggaacctgaggtca
catgcgtgggtggtagcgtgagccacgaagaccctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgcca
agacaaagccgcgggaggagcagtagaacagcagtagcctgtggtagcgtcctaccgtcctgaccaggactggctgaat
ggcaaggagtagaagtgaaggtctccaacaagccctccagccccatcgagaaaacaatctccaagccaaa

40

Amino acid sequence

PELLGGPSVFLFPPKPKDTLMISRNPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

30. T256N CH2 WCH3

Nucleotide sequence:

cctgaactcctggggggaccgtcagttctctctccccccaaacccaaggacacctcatgatctcccggaacctgaggtcac
atgcgtgggtggtagcgtgagccacgaagaccctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgcca
gacaaagccgcgggaggagcagtagaacagcagtagcctgtggtagcgtcctaccgtcctgaccaggactggctgaatg
gcaaggagtagaagtgaaggtctccaacaagccctccagccccatcgagaaaacaatctccaagccaaaggcagccc
cgagaaccacaggtgtacacctgcccccatcccggtgagctgaccaagaaccaggtcagcctgacctgctgctaaagg
50 ctctatccacgcgacatcgccgtggagtgaggagcaatggcgagccggagacaactacaagaccacgcctccctgctggtg

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actccgacggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtg
atgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

Amino acid sequence

5 PELLGGPSVFLFPPKPKDTLMISRNPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTKISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPV
LDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

10 31. 2H7 scFv VH L11S (SSS-S)H T256N CH2 WCH3

Nucleotide sequence:

aagcttgcgccatgattttcaagtgcagattttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgttctt
cccagcttccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttgcagggccagctcaagtgttaattacatgcact
15 ggtaccagcagaagccaggtatctccccaaacctggatttatccccatccaaacctggtcttggagtcctgtcgttcagtg
gcagtgggtctgggaccttactctctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgagggtt
taaccacccacgttcggtgctgggaccaagctggagctgaagatggcgggtggctcgggcggtggtgatctggaggaggtg
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tacacattaccagttacaatatgcactgggtaaacgagacacctagacagggcctggaatggattggagctatttatccaggaat
20 ggtgatacttctacaatcagaagtcaagggaaggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctattctgtgcaagagtggtgactatagtaacttactggtacttcgatgctctggggcac
agggaccacggtcaccgtctctctgatcaggagcccaatctctgacaaaactcacacatccccaccgtctcagcacctgaact
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25 cgggggaggagcagtagaacagcacgtaccgtgtggtcagcgtcctaccgtctgcaccaggactggctgaatggcaaggag
tacaaagtcaaggtctccaacaagccctccagcccccacgcagaaaacaatctccaaagccaaaggcagccccgagaacc
acaggtgtacacctgccccatccgggatgactgaccaagaaccaggtcagcctgacctgcctgggtcaaggcttctatccc
agcgacatcgccgtggagtgaggagcgaatgggcagccgggagaaactacaagaccacgctcccgctgctggactccgacg
gctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgatgag
30 gctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

Amino acid sequence

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
35 FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRNPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
40 EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSL
SPGK

45 32. 2H7 scFv VH L11S (CSS-S)H T256N CH2 WCH3

Nucleotide sequence:

aagcttgcgccatgattttcaagtgcagattttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgttctt
cccagcttccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttgcagggccagctcaagtgttaattacatgcact
50 ggtaccagcagaagccaggtatctccccaaacctggatttatccccatccaaacctggtcttggagtcctgtcgttcagtg
gcagtgggtctgggaccttactctctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgagggtt
taaccacccacgttcggtgctgggaccaagctggagctgaagatggcgggtggctcgggcggtggtgatctggaggaggtg

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ggagctctcaggettattacagcagctctggggctgagtcggtgaggcctggggcctcagtgagatgtctcgaaggcttctggc
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ggtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
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5 agggaccacgggtcaccgtctctctgatcaggagcccaaatctgtgacaaaactcacacatccccaccgtcctcagcacctgaact
cctgggggggaccgtcagctctctctctcccccaaaacccaaggacaccctcatgatctcccggaaccctgaggtcacatgcgtgg
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10 acaggtgtacaccctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgcctgggtcaaaggcttctatccc
agcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgcctcccgtgctggactccgacg
gtcctcttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcagtag
gtctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

15 Amino acid sequence
MDFQVQIFSFLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
20 TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRNPVTCVVVDVSHEDPEVKFNWY
VDGVEVHNATKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSFSVMHEALHNHYTQKSLSL
25 SPGK

33. RTPE/QNAK (255-258) CH2

Nucleotide sequence:

cctgaactcctggggggaccgtcagctcttctctctcccccaaaacccaaggacaccctcatgatctcccagaacgtaaggtcac
30 atgcgtggtggtggacgtgagccacgaagaccctgaggtcaagttcaactgggtacgtggacggcgtggaggtgcataatgccaa
gacaaagccgcgggaggagcagtagacaacagcacgtaccgtgtgtcagcgtcctcaccgtcctgcaccaggactggctgaatg
gcaaggagtacaagtcaaggtctccaacaaagccctcccagccccatcgagaaaacaatctccaagccaaa

Amino acid sequence

35 PELLGGPSVFLFPPKPKDTLMISQNAKVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

34. RTPE/QNAK (255-258)CH2 WCH3

Nucleotide sequence:

cctgaactcctggggggaccgtcagctcttctctctcccccaaaacccaaggacaccctcatgatctcccagaacgtaaggtcac
40 atgcgtggtggtggacgtgagccacgaagaccctgaggtcaagttcaactgggtacgtggacggcgtggaggtgcataatgccaa
gacaaagccgcgggaggagcagtagacaacagcacgtaccgtgtgtcagcgtcctcaccgtcctgcaccaggactggctgaatg
gcaaggagtacaagtcaaggtctccaacaaagccctcccagccccatcgagaaaacaatctccaagccaaaggcgagccc
cgagaaccacaggtgtacaccctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgcctggtcaaaagg
45 ctctatcccagcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgcctcccgtgctgg
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atgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

Amino acid sequence

50 PELLGGPSVFLFPPKPKDTLMISQNAKVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG

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QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPV
LDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

35. 2H7 scFv VH L11S (SSS-S)H RTPE/QNAK (255-258)CH2 WCH3

5

Nucleotide sequence:

aagcttccgccatggatttcaagtcagatttccagcttcctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagcttcagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgttaattacatgcact
ggtagcagcagaagccagatcctccccaaacctggatttatgccccatccaacctggcttcggagtcctgctcgttcagtg
10 gcagtggtctgggacctcttactcttcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgagattt
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15 cagcctgacatctgaagactctgcggtctatttctgtgcaagagtggtgtactatagtaactcttactggtagctctgctggggcac
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tggtggacgtgagccacgaagacctgaggtcaagttcaactggtagctggacggcgtggaggtgcataatgccagacaaagc
cgcggggagggagcaglacacagcagctaccgtgtggtagcgtcctcaccgtcctgaccaggactggctgaatggcaaggag
20 tacaagtgcaaggtctccaacaaagccctcccagccccatcgagaaacaatctccaaagccaaaggcagccccgagaacc
acaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgctgtaaggtcttatccc
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gctcctcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctccgtgatgatgag
gctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

25

Amino acid sequence

MDFQVQIFSLLISASVIIARGQIVLSQSPAILASAPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
30 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISQNAKVTCTVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
35 NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSL
SPGK

36. 2H7 scFv VH L11S (CSS-S)H RTPE/QNAK (255-258)CH2 WCH3

Nucleotide sequence:

aagcttccgccatggatttcaagtcagatttccagcttcctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagcttcagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgttaattacatgcact
ggtagcagcagaagccagatcctccccaaacctggatttatgccccatccaacctggcttcggagtcctgctcgttcagtg
40 gcagtggtctgggacctcttactcttcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgagattt
taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcgggtggctcgggcgggtggatctggaggagtg
ggagctctcaggcttatctacagcagctggggctgagtcggtgagggcctggggcctcagtgaaagatgctcgaaggtctggc
45 tacacattaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
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50 cctggggggaccgtcagcttctcttcccccaaaacccaaggacacctcatgatctccagaacgctaaggtcacatgcgtgg
tggtggacgtgagccacgaagacctgaggtcaagttcaactggtagctggacggcgtggaggtgcataatgccagacaaagc

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cgcgggaggagcagtacaacagcacgtaccgtgtggtcagcgtctcaccgtcctgcaccaggactggctgaatggcaaggag
tacaagtgaaggtctccaacaagccctcccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
acaggtgtacacctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgcctggctaaaggcttctatccc
agcgacatcgccgtggagtgggagagcaatgggcagccggagaaactacaagaccacgcctcccgtgctggactccgacg
5 gctccttcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgag
gctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
10 QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWFYFDVWGTGTTVTVSSDQEPKSCDK
15 THTSPSSAPELLGGPSVFLFPPKPKDTLMISQNAKVTCTVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFCSSVMHEALHNHYTQKSLSL
SPGK

20 36. K290Q CH2 region

Nucleotide sequence:

cctgaactcctgggggaccgtcagtccttcttcccccaaaacccaaggacaccctcatgatctcccgaccctgaggtcac
atgctgtgtgtggacgtgagccacgaagaccctgaggtcaagtcaactgtacgtggacggcgtggaggtgcataatgcaa
25 gacacagccgaggaggagcagtacaacagcacgtaccgtgtggtcagcgtctcaccgtcctgcaccaggactggctgaatg
gcaaggagtacaagtgaaggtctccaacaagccctcccagccccatcgagaaaacaatctcaaaagccaaa

Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTQPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

30

37. K290Q CH2 WCH3

Nucleotide sequence:

Cctgaactcctgggggaccgtcagtccttcttcccccaaaacccaaggacaccctcatgatctcccgaccctgaggtca
catgctgtgtgtggacgtgagccacgaagaccctgaggtcaagtcaactgtacgtggacggcgtggaggtgcataatgcca
35 agacacagccgaggaggagcagtacaacagcacgtaccgtgtggtcagcgtctcaccgtcctgcaccaggactggctgaat
ggcaaggagtacaagtgaaggtctccaacaagccctcccagccccatcgagaaaacaatctccaaagccaaaggcagcc
ccgagaaccacaggtgtacacctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgcctggtcaaaag
gcttctatcccgacacatcgccgtggagtgggagagcaatgggcagccggagaaactacaagaccacgcctcccgtgctg
gactccgacggctccttcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgt
40 gatgcatgaggctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTQPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
45 QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPV
LDSGDSFFLYSKLTVDKSRWQQGNVFCSSVMHEALHNHYTQKSLSLSPGK

38. 2H7 scFv VH L11S (SSS-S)H K290Q CH2 WCH3

Nucleotide sequence:

aagcttgcggccatggatttcaagtgcagatttcagcttctgctaatcagtgcttcagtcataattgccagaggacaaattgttctct
50 cccagctctccagcaatcctgtctgcacatccaggggagaaggtcacaatgacttcagggccagctcaagtgtaagttacatgcact

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ggtaccagcagaagccaggatcctccccaaacctggatttatgccccatccaacctggcttctggagtcctgctcgcttcagt
gcagtgggtctgggaccttactctctcacaatcagcagagtggaggctgaagatgctgccacttattactgccagcagtggagttt
taaccacccacggttcggtgctgggaccaagctggagctgaaagatggcggaggctcggcggtggatctggaggagggtg
ggagctctcaggcttatctacagcagcttggggctgagtcggtgaggcctggggcctcagtgaagatgctcctgaaggcttctggc
5 tacacatttaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
ggtgatacttctacaatcagaagttcaagggcaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctatttctgtgcaagagtgggtgactatagtaactcttactggacttctgatctggggcac
agggaccacgggtcaccgtcttctgacagggagcccaaatcttctgacaaaactcacacatccccaccgtcctcagcacctgaact
cctggggggaccgtcagttcttcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtgg
10 tgggtggacgtgagccacgaagacctgaggtcaagttcaactggtagcgtggacggcgtggaggtgcataatgccaagacacagc
cgcgggaggagcagtacaacagcacgtaccgtgtggtcagcgtcctcaccgtctgcaccaggactggctgaatggcaaggag
tacaagtgaaggttccaacaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
acaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgcctggctcaaggcttctatccc
agcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccagcctcccgctggtgactccgacg
15 gctccttcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgatgag
gctctgcacaaccactacacgcagaagagcctctcctgtctcgggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
20 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFVDVWGTGTTTVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
25 DGVEVHNAKTQPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
PGK

39. 2H7 scfv VH L11S (CSS-S)H K290Q CH2 WCH3

Nucleotide sequence:

aagcttgcgccatggatttcaagtcagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaaattgttctct
cccagctccagcaatcctgtctgcatctccaggggagaaggtcacaatgacttcagggccagctcaagtgttaagttacatgcact
ggtagcagaagccaggatcctccccaaacctggatttatgccccatccaacctggcttctggagtcctgctcgcttcagt
35 gcagtgggtctgggaccttactctctcacaatcagcagagtggaggctgaagatgctgccacttattactgccagcagtggagttt
taaccacccacggttcggtgctgggaccaagctggagctgaaagatggcggaggctcggcggtggatctggaggagggtg
ggagctctcaggcttatctacagcagcttggggctgagtcggtgaggcctggggcctcagtgaagatgctcctgaaggcttctggc
tacacatttaccagttacaatatgcactgggtaagcagacacctagacagggcctggaatggattggagctatttatccaggaaat
ggtgatacttctacaatcagaagttcaagggcaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
40 cagcctgacatctgaagactctgcggtctatttctgtgcaagagtgggtgactatagtaactcttactggacttctgatctggggcac
agggaccacgggtcaccgtcttctgacagggagcccaaatcttctgacaaaactcacacatccccaccgtcctcagcacctgaact
cctggggggaccgtcagttcttcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtgg
tgggtggacgtgagccacgaagacctgaggtcaagttcaactggtagcgtggacggcgtggaggtgcataatgccaagacacagc
cgcgggaggagcagtacaacagcacgtaccgtgtggtcagcgtcctcaccgtctgcaccaggactggctgaatggcaaggag
45 tacaagtgaaggttccaacaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
acaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgcctggctcaaggcttctatccc
agcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccagcctcccgctggtgactccgacg
gctccttcttctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgatgag
gctctgcacaaccactacacgcagaagagcctctcctgtctcgggtaaatgatctaga

Amino acid sequence:

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PCT/US2003/041600

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 FNPPTFGAGTKLELKDGGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
 5 TAYMQLSSLTSEDSAVYFCARVYYNSYWFYDVGWGTGTTVTVSSDQEPKSCDK
 THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
 DGVEVHNAKTQPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
 KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
 NYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFCSSVMHEALHNHYTQKSLSLS
 10 PGK

40. A339PCH2

Nucleotide sequence:

cctgaactcctgggggaccgtcagttctctctccccccaaaacccaaggacaccctcatgatctcccggaccctgaggtcac
 15 atgcgtggtggtggacgtgagccacgaagaccctgaggtcaagttaactggtacgtggacggcgtggaggtgcataatgccaa
 gacaaagccgcgggaggagcagtagacaacagcacgtaccgtgtggtcagcgtcctcaccgtcgtcaccaggactggctgaatg
 gcaaggagtagacaagtgcagggtctccaacaaagccctcccagccccatcgagaaaacaatctcaaacccaaa

Amino acid sequence:

20 PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
 AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKPK

41. A339P-CH2 WCH3

25 Nucleotide sequence:

cctgaactcctgggggaccgtcagttctctctccccccaaaacccaaggacaccctcatgatctcccggaccctgaggtcac
 atgcgtggtggtggacgtgagccacgaagaccctgaggtcaagttaactggtacgtggacggcgtggaggtgcataatgccaa
 gacaaagccgcgggaggagcagtagacaacagcacgtaccgtgtggtcagcgtcctcaccgtcgtcaccaggactggctgaatg
 gcaaggagtagacaagtgcagggtctccaacaaagccctcccagccccatcgagaaaacaatctcaaacccaaaagggcagccc
 30 cgagaaccacaggtgtacaccctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgctggtgcaagg
 ctctatcccagcgacatcgccgtggagtgaggagagcaatgggcagccggagaaactacaagaccacgcctcccgtgctgg
 actccgacggctctctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctccgtg
 atgcatgaggtctgcacaaccactacacgcagaagagcctctcctgctccgggtaaatgatctaga

35 Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
 AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKPKG
 QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPV
 40 LDSGDSFFLYSKLTVDKSRWQQGNVFCSSVMHEALHNHYTQKSLSLSPGK

42. 2H7 scFv VHL11S (SSS-S)H A339P CH2 WCH3

Nucleotide sequence:

aagcttgccgccatggatttcaagtgcagatttcagcttctgctaatactgcttcagtcataattgccagaggacaaattgttctct
 cccagctctccagcaatctgtctgcatctccaggggagaaggtcaccaatgacttcagggccagctcaagtgttaagtacatgcact
 45 ggtaccagcagaagccaggatctctccccaaacctggatttatccccatccaacctggctctggagtcctgtcgtctcagtg
 gcagtggtgtctgggacctcttactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgaggtt
 taaccaccccacgttcggtgctgggaccaagctggagctgaaagatggcgggtggtcgggcgggtggtggtatctggaggaggtg
 ggagctctcaggttatctacagcagctctggggtgagtcggtgaggcctgggcctcagtgaaatgctcgtcaaggcttctggc
 tacacattaccagttacaatatgcactgggtaaacgagacacctagacagggcctggaatggattggagctatttatccaggaaat
 50 ggtgatacttctacaatcagaagttcaagggaagccacactgactgtagacaaatctccagcacagcctacatgcagctcag
 cagcctgacatctgaagactctcggtctatttctgtgcaagagtggtgtactatagtaactcttactggtacttcgatgtctggggcac

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agggaccacgggtcaccgtctctctgatcaggagcccaaatctcttgacaaaactcacacatccccaccgtcctcagcacctgaact
cctggggggaccgtcagttctctctctcccccaaaacccaaggacaccctcatgatctccggaccctgagggtcacatgcgtgg
tggtggacgtgagccacgaagaccctgaggtcaagtcaactggtagtggtggcgtggaggtgcataatgccaagacaaagc
cgcgaggagcagtagacaacagcacgtaccgtgtggtcagcgtcctcaccgtctgcaccaggactgggtgaatggcaaggag
5 tacaagtgcagggtctcaacaaagccctcccagccccatcgagaaaacaatctccaaacccaagggcagccccgagaacc
acaggtgtacaccctgccccatcccgggatgagctgaccaagaaccagggtcagcctgacctgcctgggtcaaaggcttctatccc
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gtctcttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcagtag
gctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

10

Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
15 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKPKGQPPEPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
20 NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
PGK

43. 2H7 scFv VHL11S (CSS-S)H A339P CH2 WCH3

25 Nucleotide sequence:

aagcttgccgccattgatttcaagtcagatttccagcttctgctaatcagtgcttcagtcataattgccagaggacaaattgtctct
cccagctctccagcaatcctgtctgcatctccaggggagaaggtcacatgacttcagggccagctcaagtgttaattacatgcact
ggtagcagcagaagccaggtatctccccaaacctggatttatccccatccaacctggcttctggagtcctgtcgtctcagtg
gcagtgggtctgggaacctctactctctcaaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtgaggatt
30 taaccacccacgttcgggtgctgggaccaagctggagctgaaagatggcgggtgctcggcggtgggtgagctggaggaggtg
ggagctctcaggttatctacagcagctggggctgagtcggtaggcctggggcctcagtgaaatgctcctgcaagctctctggc
tacacattaccagttacaatatgcactgggtaaagcagacacctagacagggcctggaatggattggagctattatccaggaaat
ggtagacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctatttctgtgcaagagtgggtactatagtaactcttactggtactctgatgtctggggcac
35 agggaccacgggtcaccgtctctctgatcaggagcccaaatctgtgacaaaactcacacatccccaccgtcctcagcacctgaact
cctggggggaccgtcagttctctctctcccccaaaacccaaggacaccctcatgatctccggaccctgagggtcacatgcgtgg
tggtggacgtgagccacgaagaccctgaggtcaagtcaactggtagtggtggcgtggaggtgcataatgccaagacaaagc
cgcgaggagcagtagacaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccaggactgggtgaatggcaaggag
tacaagtgcagggtctcaacaaagccctcccagccccatcgagaaaacaatctccaaacccaagggcagccccgagaacc
40 acaggtgtacaccctgccccatcccgggatgagctgaccaagaaccagggtcagcctgacctgcctgggtcaaaggcttctatccc
agcgacatcgccgtggagtgaggagagcaatgggcagccggagaaactacaagaccacgcctcccgtgctggactccgacg
gtctcttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcagtag
gctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

45 Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
50 TAYMQLSSLTSEDSAVYFCARVVYYNSNSYWFYFDVWGTGTTVTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV

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DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKPKGQPREEPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVSCSVMHEALHNHYTQKSLSLS
PGK

5

44. G28-1VH

Nucleotide sequence:

gcgggtccagctgcagcagctggacctgagctgaaaagcctggcgcttcagtgaaatttctgcaaggcttctggttactcattc
10 actggctacaatatgaactgggtgaagcagaataatgaaagagccttgagtgattggaaatattgatccttattatggtggtacta
cctacaaccgggaagtcaagggaagccacattgactgtagacaaatcctccagcacagcctacatgcagctcaagagctctgac
atctgaggactctgcagctctattactgtgcaagatcggtcgccctatggactactgggggtcaaggaaacctcagtcaccgtctcttc
gatcag

15 Amino acid sequence:

AVQLQQSGPELEKPGASVKISCKASGYSFTGYNMNWVKQNNGKSLEWIGNIDPY
YGGTTYNRKFKGKATLTVDKSSSTAYMQLKSLTSEDSAVYYCARSVGPMDYWG
QGTSVTVSSDQ

45. G28-1VL

Nucleotide sequence:

aagcttgcggccatggtatccacagctcagttccttgggttgcctgctgctgtggcttacaggtggcagatgtgacatccagatgactc
agtctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaatatgttacagttatttggcttgg
20 atcagcagaacagggaatatctcctcagctcctggctcttttgcaaaaaccttagcagaaggtgtgccatcaagggtcagtgga
gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagtatttctgtcaacatcattccgataat
ccgtggacgttcggtggaggcaccgaactggagatcaaaaggtggcgggtggctcgggcgggtgggtgggtcgggtggcgccggat
cgta

Amino acid sequence:

30 MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLA
YQQKQKGKSPQLLVSFATLAEGVPSRFSGSGSGTQFSLKISSLPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGSGGGGSGGGGSS

46. G28-1 scFv

Nucleotide sequence:

aagcttgcggccatggtatccacagctcagttccttgggttgcctgctgctgtggcttacaggtggcagatgtgacatccagatgactc
agtctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaatatgttacagttatttggcttgg
40 atcagcagaacagggaatatctcctcagctcctggctcttttgcaaaaaccttagcagaaggtgtgccatcaagggtcagtgga
gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagtatttctgtcaacatcattccgataat
ccgtggacgttcggtggaggcaccgaactggagatcaaaaggtggcgggtggctcgggcgggtgggtgggtcgggtggcgccggat
cgtcagcgggtccagctgcagcagctgtgacctgagctgaaaagcctggcgcttcagtgaaatttctgcaaggcttctggttact
cattcactggctacaatatgaactgggtgaagcagaataatgaaagagccttgagtgattggaaatattgatccttattatggtggt
actacctacaaccgggaagtcaagggaagccacattgactgtagacaaatcctccagcacagcctacatgcagctcaagagctc
45 gacatctgaggactctgcagctctattactgtgcaagatcggtcgccctatggactactgggggtcaaggaaacctcagtcaccgtctc
ttctgatcag

Amino acid sequence:

50 MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLA
YQQKQKGKSPQLLVSFATLAEGVPSRFSGSGSGTQFSLKISSLPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGSGGGGSGGGGSSAVQLQQSGPELEKPGASVKISCKA

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SGYSFTGYNMNWVKQNNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMDYWGQTSVTVSSDQ

5 **47. G28-1 VHL11S**

Nucleotide sequence:

gcgggtccagctgcagcagctcggacctgagtcggaaaagcctggcgcttcagtgaaagattcctgcaaggcttctggttactcattc
actggttacaatatgaactgggtgaagcagaataatggaaagagccttgagtgattggaaatattgatccttattatggtggtacta
cctacaaccggaagttcaaggggcaaggccacattgactgtagacaaatcctccagcacagcctacatgcagctcaagagctgac
10 atctgaggactctgcagctctattactgtgcaagatcggtcggccctatggactactggggtaaggaacctcagtcaccgtctctct
gatcag

Amino acid sequence:

15 AVQLQQSGPESEKPGASVKISCKASGYSFTGYNMNWVKQNNGKSLEWIGNIDPYY
GGTTYNRKFKGKATLTVDKSSSTAYMQLKSLTSEDSAVYYCARSVGPMDYWGQ
GTSVTVSSDQ

20 **48. G28-1 VHL11S scFv**

Nucleotide sequence:

aagcttgccgcatggtatccacagctcagttccttgggttgctgctgctgtggcttacagtggtgcagatgtgacatccagatgactc
agtctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaatatgtttacagttatttggcttgg
atcagcagaacagggaaaatctctcagctcctggtctcttttgcacaaaccttagcagaaggtgtccatcaagggtcagtgga
25 gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagttatttctgcaacatcattccgataat
ccgtggacgttcggtggagggcaccgaactggagatcaaaaggtggcgggtgctcggcggtgggtgggtcgggtggcggcggt
cgtcagcgggtccagctgcagcagcttgacctgagtcgaaaagcctggcgcttcagtgaaagattcctgcaaggcttctggttact
cattcactggctacaatatgaactgggtgaagcagaataatggaaagagccttgagtgattggaaatattgatccttattatggtggt
actacctacaaccggaagttcaaggggcaaggccacattgactgtagacaaatcctccagcacagcctacatgcagctcaagagctc
30 gacatctgaggactctgcagctctattactgtgcaagatcggtcggccctatggactactggggtaaggaacctcagtcaccgtctc
ttctgatcag

Amino acid sequence:

35 MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLA
YQKQKGKSPQLLVSFAKTLAEGVPSRFSGSGSGTQFSLKISSLPEDSGSYFCQHH
DNPWTFGGGTELEIKGGGGSGGGSGGGSSAVQLQQSGPESEKPGASVKISCKA
SGYSFTGYNMNWVKQNNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMDYWGQTSVTVSSDQ

40 **49. G28-1 scFv (SSS-S)H WCH2 WCH3**

Nucleotide sequence:

aagcttgccgcatggtatccacagctcagttccttgggttgctgctgctgtggcttacagtggtgcagatgtgacatccagatgactc
agtctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaatatgtttacagttatttggcttgg
atcagcagaacagggaaaatctctcagctcctggtctcttttgcacaaaccttagcagaaggtgtccatcaagggtcagtgga
45 gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagttatttctgcaacatcattccgataat
ccgtggacgttcggtggagggcaccgaactggagatcaaaaggtggcgggtgctcggcggtgggtgggtcgggtggcggcggt
cgtcagcgggtccagctgcagcagcttgacctgagtcgaaaagcctggcgcttcagtgaaagattcctgcaaggcttctggttact
cattcactggctacaatatgaactgggtgaagcagaataatggaaagagccttgagtgattggaaatattgatccttattatggtggt
actacctacaaccggaagttcaaggggcaaggccacattgactgtagacaaatcctccagcacagcctacatgcagctcaagagctc
50 gacatctgaggactctgcagctctattactgtgcaagatcggtcggccctatggactactggggtaaggaacctcagtcaccgtctc
ttctgatcatgatcaggagcccaaatcttctgacaaaactcacacatcccaccgtcctcagcactgaactcctgggggggaccgtc

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agtcttctcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtggtggtggacgtgagcc
 acgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgccaagacaaagccgaggaggagca
 gtacaacagcacgtaccgtgtggtcagcgtctcaccgtctgcaccaggactggctgaatggcaaggagtacaagtgcaaggct
 tccaacaaagccctcccagccccatcgagaaaacaatctccaaagccaaagggcagccccgagaaccacaggtgtacacct
 5 gccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcaaaggcttctatcccagcgacatcgccgtg
 gagtgggagagcaatgggcagccggagaacaactacaagaccacgctcccgtgctggactccgacggctccttctctctac
 agcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgaggctctgcacaaccact
 acacgcagaagagcctctcctgtctccgggtaaatgatctaga

10 Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLAW
 YQQKQGKSPQLLVSF AKTLAEGVPSRFSGSGSGTQFSLKISSLPEDSGSYFCQHHS
 DNPWTFGGGTELEIKGGGGSGGGSGGGSSAVQLQQSGPELEKPGASVKISCKA
 SGYSFTGYNMNWKQNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
 15 AYMQLKSLTSEDSAVYYCARSVGPMDYWGQTSVTVSSDHDQEPKSSDKTHTSP
 PSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVE
 VHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISK
 AKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKT
 TPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

20

50. G28-1 scFv IgAW H IgG1WCH2 WCH3

Nucleotide sequence:

aagettccgccatglatccacagctcagttccttgggtgctgctgctggtgcttacaggtggcagatgtgacatccagatgactc
 agtctccagctccctatctgcatctgtggagagactgtcaccatcacatgtcgaacaagtgaatatgtttagatttggcttggt
 25 atcagcagaacagggaaaatctcctcagctcctggtctcttttgcacaaacctagcagaaggtgtgccatcaagggtcagtgga
 gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagtatttctgcaacatcattccgataat
 ccgtggacgttcggtggagccaccgaactggagatcaaaagtgccgggtgctcggcggtggtgggtcgggtggcgccggat
 cgtcagcggtccagctgcagcagctgtgacctgagctggaaaagcctggcgcttcagtgagatttctgcaaggcttctgttact
 cattcactggctacaatatgaactgggtgaagcagaataatgaaagagccttgagtggaattggaatatgatccttattatggtggt
 30 actacctacaaccggaagtcaagggaaggccacattgactgtagacaaatctccagcacagcctacatgcagctcaagagctc
 gacatctgaggactctgcagcttattactgtgaagatcggtcggccctatggactactggggtcaaggaaacctcagtcaccgtctc
 ttctgatcagccagttccctcaactccacctacccatctccctcaactccacctacccatctccctcatcgccacctgaactcctgg
 gggaccgtcagttctcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtggtggtg
 gacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgccaagacaaagccgag
 35 ggaggagcagtcacaacagcacgtaccgtgtggtcagcgtctcaccgtctgcaccaggactggctgaatggcaaggagtacaa
 gtgcaaggtctccaacaaagccctcccagccccatcgagaaaacaatctccaaagccaaagggcagccccgagaaccacagg
 tgfaccacctgccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcaaaggcttctatcccagcga
 catcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgctcccgtgctggactccgacggctcct
 tctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgaggctctg
 40 cacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLAW
 YQQKQGKSPQLLVSF AKTLAEGVPSRFSGSGSGTQFSLKISSLPEDSGSYFCQHHS
 45 DNPWTFGGGTELEIKGGGGSGGGSGGGSSAVQLQQSGPELEKPGASVKISCKA
 SGYSFTGYNMNWKQNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
 AYMQLKSLTSEDSAVYYCARSVGPMDYWGQTSVTVSSDQVPSTPPTPSPSTPPT
 PSPSCAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDG
 VEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTI
 50 SKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNY

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KTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG
K

51. G28-1 scFv VHL11S (SSS-S)H WCH2 WCH3

5 Nucleotide sequence:

aagcttgccgcatggtatccacagctcagttccttgggtgctgctgctggttacaggtggcagatgtgacatccagatgactc
agtcctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaataatgttacagtatttgcttggg
atcagcagaaacagggaaaatctctcagctcctggtctctttgcaaaaaccttagcagaaggtgtccatcaagggtcagtgga
gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagtatttctgtcaacatcattccgataat
10 ccgtggacgttcggtggagggaccgaactggagatcaaaaggtggcgggtggtcggcggtggtgggtggcggtggcggtggt
cgtcagcgggtccagctgcagcagctgtgacctgagtcggaaaagcctggcgcttcagtggaagatttctgcaaggcttctggttact
cattcactggctacaatatgaactgggtgaagcagaataatgaaagagccttgagtgattggaatattgatccttattatggtggt
actacctacaaccggaagtcaagggaagggccactgactgtagacaaatcctccagcacagcctacatgcagctcaagagctc
gacatctgaggactctgcagctctattactgtgaagatcggtcggccctatggactactgggtgcaaggaaacctcagtcaccgtctc
15 ttctgatcaggagcccaaatcttctgacaaaactcacatccccaccgtcctcagcacctgaactcctggggggaccgtcagctctt
cctcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtggtggtggacgtgagccacgaa
gacctgaggtcaagttcaactggtacgtggacggcggtggaggtgcataatgccaagacaaagccggggaggagcagtagacaa
cagcacgtaccgtgtggtcagcgtcctaccgtcctgcaccaggactggctgaatggcaaggagtacaagtgcagggtctccaac
aaagccctcccagccccatcgagaaaacaatctccaagccaaagggcagccccgagaaccacaggtgtacacctgcccc
20 atccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcgaaggcttctatcccagcgacatcgccgtggagtggtg
gagagcaatgggcagccggagaaacaactacaagaccacgctcctcgtggtgactccgacggctccttctctctacagcaag
ctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgcatgaggctctgcacaaccactacacgc
agaagagcctctcctgtctccggtaaatgatctaga

25 Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTTTCRTSENVYSYLA
YQQKQKGKSPQLLVSFATLAEGVPSRFSGSGSGTQFSLKISSLQPEDSGSYFCQHH
DNPWTFGGGTELEIKGGGSGGGGSGGGGSSAVQLQSGPSEKPGASVKISCKA
SGYSFTGYNMNWKQNNNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
30 AYMQLKSLTSEDSAVYYCARSVGPMDYWQGTSTVTVSSDHDQEPKSSDKTHTSP
PSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVE
VHNAKTKPREEQYNSTYRVVSVLTVHLQDNLNGKEYKCKVSNKALPAPIEKTISK
AKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKT
TPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK
35

52. G28-1 scFv VHL11S (CSS-S)H WCH2 WCH3

Nucleotide sequence:

aagcttgccgcatggtatccacagctcagttccttgggtgctgctgctggttacaggtggcagatgtgacatccagatgactc
agtcctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaataatgttacagtatttgcttggg
40 atcagcagaaacagggaaaatctctcagctcctggtctctttgcaaaaaccttagcagaaggtgtccatcaagggtcagtgga
gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagtatttctgtcaacatcattccgataat
ccgtggacgttcggtggagggaccgaactggagatcaaaaggtggcgggtggtcggcggtggtgggtggcggtggcggtggt
cgtcagcgggtccagctgcagcagctgtgacctgagtcggaaaagcctggcgcttcagtggaagatttctgcaaggcttctggttact
cattcactggctacaatatgaactgggtgaagcagaataatgaaagagccttgagtgattggaatattgatccttattatggtggt
45 actacctacaaccggaagtcaagggaagggccactgactgtagacaaatcctccagcacagcctacatgcagctcaagagctc
gacatctgaggactctgcagctctattactgtgaagatcggtcggccctatggactactgggtgcaaggaaacctcagtcaccgtctc
ttctgatcaggagcccaaatcttctgacaaaactcacatccccaccgtcctcagcacctgaactcctggggggaccgtcagctctt
cctcttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtggtggtggacgtgagccacgaa
gacctgaggtcaagttcaactggtacgtggacggcggtggaggtgcataatgccaagacaaagccggggaggagcagtagacaa
50 cagcacgtaccgtgtggtcagcgtcctaccgtcctgcaccaggactggctgaatggcaaggagtacaagtgcagggtctccaac
aaagccctcccagccccatcgagaaaacaatctccaagccaaagggcagccccgagaaccacaggtgtacacctgcccc

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atcccgggatgagctgaccaagaaccaggctcagcctgacctgcctgggtcaaaggcttctatccagcgacatcgccgtggagtgg
gagagcaatgggcagccgggagaacaactacaagaccacgcctcccgctgctggactccgacggctcttcttctctacagcaag
ctcacctggacaagagcaggtggcagcaggggaaacgtcttctcatgctccgtgatgcatgaggctctgcacaaccactacacgc
agaagagcctctccctgtctccgggtaaatgatctaga

5

Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLAW
 YQQKQKGKSPQLLVSFAKTLAEGVPSRFSGSGSGTQFSLKISSLPEDSGSYFCQHHS
 DNPWTFGGGTELEIKGGGSGGGGSGGGGSSAVQLQQSGPESEKPGASVKISCKA
 10 SGYSFTGYNMNWVKQNGKSLEWIGNIDPYGGTTYNRKFKGKATLTVDKSSST
 AYMQLKSLTSEDSAVYYCARSVGPMDYWGQGSVTVSSDQEPKSCDKTHTSPSS
 APELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVH
 NAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK
 GQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPP
 15 VLDSGDSFFLYSKLTVDKSRWOOGNVFSCSVMEALHNHYTOKLSLSPGK

53. G28-1 scFv VH L11S (CSC-S)H WCH2 WCH3

Nucleotide sequence:

20 aagcttgcgcgatggtatccacagctcagttccttgggttgctgctgctgtggcttacaggtggcagatgtgacatccagatgactc
agctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaaaatgtttacagttatttgcttgggt
atcagcagaaacagggaatatctctcagctcctgggtctctttgcaaaaaccttagcagaaggtgtgccatcaagggttcagttggca
gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagtatttctgtcaacatcatccgataat
ccgtggacgttcgggtggagggcaccgaactggagatcaaaaggtggcgggtggctcggcggtgggtgggtcgggtggcgccgat
25 cgtcagcgggtccagctgcagcagctctggacctgagtcggaaaagcctggcgcttcagtgaagatttctgcaaggcctcttggttact
cattcacigggctacaatatgaactgggtgaagcagaataatggaagagaccttgagtggattggaatatattgacaccttattatggtgggt
actacctacaaccggaagltcaagggcgaaggccacatftgactgtagacaaatcctccagcacagcctacatgcagctcaagaagtct
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ttctgatcaggagcccaaatcttgtacaaaactcacacatctccaccgtgctcagcacctgaactcctgggtggacctcagctctc
ctcttccccccaaaacccaaggacacctcatgatctccgggaccctgaggtcacatgcgtggtgggtggacctgagccacgaag
30 acctgaggtcaaggtcaactgtactgtggacggcggtggaggtgcataatgccaagacaaagccgcgggaggagcagtacaac
agcagctaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaaggagtacaagtgaaggcttccaaca
aagccctcccagccccatcgagaaaacaatctccaaagccaaagggcagccccgagaaccacaggtgtacacctgccccca
tccgggatgagctgaccaagaaccagggtcagcctgacctgctggtcgaaggcttctatccaagcgacatcgccgtggagtgg
gagagcaatgggcagccggagaaacaactacaagaccacgctcccgctgctggactccgacggctccttctcctctacagcaag
35 ctacacctggacaagagcaggtggcagcagggggaacgtcttctcatgctccgtgatgcatgaggctctgcacaaccactacacgc
agaagagcctctccctgtctccgggttaaatgatctaga

Amino acid sequence:

40 MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVVSYLAW
YQQKQKGKSPQLLVSF AKTLAEGVPSRFGSGSGGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGGSGGGGSGGGGSSAVQLQQSGPESEKPGASVKISCKA
SGYSFTGYNMNWKQNNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPM DYWGQGTSVTVSSDQEPKSCDKTHTSPPC
45 SAPELLGGPSVFLFPPKPKDTLMISRTP EVTCVVVDVSHEDPEVKFNWYVDGVEV
HNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKA
KGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTP
PVLDSGDGSFFLYSKLTVDKSRWOOGNVFC SVMHEALHNHYTOKLSLSLSPGK

50 54. **G28-1 scFv VH L11S (SSC-P)H WCH2 WCH3**

Nucleotide sequence:

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aagcttgccgcatggtatccacagctcagttccttgggtgctgctgctgtggcttacaggtggcagatgtgacatccagatgactc
agtctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaatatgtttacagttatttgcttggt
atcagcagaacagggaatatctcctcagctcctggtctcttttgcataaaccttagcagaagggtgcatcaagggtcagtgga
gtggatcaggcacacagtttctctgaagatcagcagcctgcagcctgaagattctggaagtatttctgtcaacatcattccgataat
5 ccgtggacgttcggtggagggaccgaactggagatcaaaagggtggcgggtggctcgggcgggtgggtgggtcgggtggcggcgat
cgtcagcgggtccagctgcagcagctggtgacgtgagtcgaaaagcctggcgctcagtgaaagtcttgcagggtcttggttact
cattcactggctacaataatgaactgggtgaagcagaataatggaagagccttgagtgattggaatattgatccttattatggtggt
actacctacaaccggaagtcaagggaaggccacattgactgtgacaaatcctccagcacagcctacatgcagctcaagagctc
gacatctgaggactctgcagctctattactgtgaagatcggtcgccctatggactactgggtcgaaggaaacctcagtcaccgtctc
10 tctgatcaggagcccaaatctctgacaaaactcacacatccccaccgtgcccagcacctgaactcctggggggaccgtcagctctt
cctctccccccaaaacccaaggacacctcatgatctccggaccttgaggtcacatgcgtggtggtggacgtgagccacgaa
gacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgccaagacaagccgcgggaggagcagtacaa
cagcacgtaccgtgtgtcagcgtcctcaccgtctgcaccaggactggctgaatggcaaggagtacaagtgaagggtctccaac
aaagccctcccagccccatcgagaaaacaatctcaaaagccaagggcagccccgagaaccacaggtgtacacctgcccc
15 atccgggatgagctgaccaagaaccagggtcagcctgacctgctgctaaaggctctatccagcgacatcgccgtggagtggtg
gagagcaatgggcagccggagaaacaactacaagaccacgctcctcgtgctggactccgacggctccttctctctacagcaag
ctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctccgtgatgcatgaggtctctgcacaaccactacacgc
agaagagcctctcctgtctccggtaaatgatctaga

20 Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLA
YQQKQKGKSPQLLVSFATLAEGVPSRFSGSGSGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGSGGGGSGGGGSSAVQLQQSGPESEKPGASVKISCKA
SGYSFTGYNMNWKQNNKSLWIGNIDPYGGTTYNRKFKGKATLTVDKSSST
25 AYMQLKSLTSEDSAVYYCARSVGPMDYWGQGTSTVTVSSDQEPKSSDKTHTSPPCP
APELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVH
NAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK
GQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPP
VLDSGDSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK
30

II. 54. HCTLA4 HIGG1 (SSS-S)H P238SCH2 WCH3

Nucleotide sequence:

atggcttccttgatttcagcggcacaaggctcagctgaacctggctgccaggacctggcctgcactctcctgtttttctctctc
atcctgtctcttgcaaaagcaatgcacgtggccagcctgctgtggtactggccagcagccgaggtatcgccagcttctgtgtga
35 gtatgcatctccagcgaagccactgaggtccgggtgacagtgttcggcaggtgacagccaggtgactgaagtctgtcgggc
aacctacatgacgggaatgagttgacctcttagatgattccatctgcacgggcacctccagtgaatacaagtgaacctcactat
ccaaggactgagggccatggacacgggactctacatctgcaagggtggagctcatgtaccaccgccatactacctgggcatagg
caacggaaccagatttatgtaattgatccagaacctgcccagattctgatcaacccaaatctctgacaaaactcacacatcccca
ccgtcctcagcactgaactcctggggggatcgctagttctcttccccccaaaacccaaggacacctcatgatctccggac
40 cctgaggtcacatgcgtggtggtggacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggt
gcataatgccaagacaagccgcgggaggagcagtagaacagcagctaccgtgtgtgcagcgtcctcaccgtctgcaccagg
actggctgaatggcaaggagtacaagtgaaggtctccaacaagccctcccagccccatcgagaaaacaatctccaaagcca
aagggcagccccgagaaccacaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgc
ctgtcaaaaggctctatccagcgacatcgccgtggagtgaggagcaatgggcagccggagaaacaactacaagaccacgcc
45 tccgtgctgactccgacggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctct
catgctccgtgatgcatgaggtctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatga

Amino acid sequence:

MACLGFRHKAQLNLAARTWPCTLLFFLLFIPVFCKAMHVAQPAVVLAASSRGAS
50 FVCEYASPGKATEVRVTVLRLQADSQVTEVCAATYMTGNELTFLDDSICTGTSSGN

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QVNLTIQGLRAMDTGLYICKVELMYPPPYLIGINGTQIYVIDPEPCPDSDQPKSSD
KTHTSPPSSAPELLGGSSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
5 NNYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFSFSVMHEALHNHYTQKSLSL
SPGK

55. FC2-2 VL

Nucleotide sequence:

10 gttgtaagcttgccgccatggattcacagggcagggttctatgttactgctgctatgggtatctggtacctgtggggacattgtgatg
tcacagtctccatcctcctagctgtgtcagttggagagaagggttctatgagctgcaagtccagtcagagccctttatataatcacaat
caaaagaactacttggcctggtaccagcagataaccagggcagttctcctaaactgctgatttactgggcacccactaggggaatctgg
ggtcctgatcgcttcacaggcagtggtatctgggacagatttactctcaccatcagcagagtgaaggctgaagacctggcagttta
15 ttactgtcagcaatattatactatcctccacgttcggaggtggcaccagctggaaataaaagggtggcgggtgctcgggcgggtg
gtgggtcgggtggcggcgggagctcg

Amino acid sequence:

MDSQAQVLMMLLLWVSGTCGDIVMSQSPSSLA VSVGEKVSMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDRFTGSGSGTDFTLTISR VKAEDLA
20 VYYCQQYYTYPPTFGGG TKLEIKGGGSGGGGSGGGGSS

56. FC2-2VH

Nucleotide sequence:

Gggagctgcaggtgcagttgaaggagtcaggacctggcctggggcgcctcacagagcctgtccatcacatgcaccgtctca
25 ggggtctcaftaaccgtctatgggttaactgggttcgccagcctccaggaaagggtctggactggctgggaatgatatggggat
ggaagcacagactataattcagctctcaatccagactgagcatcagtaaggacaactccaagagccaagtttcttaaaatggac
agtctacaaactgatgacacagccaggtactactgtgccagagatcactatggtaccactatgctatggactactggggcaagga
acctcagtcaccgtctcctctgatcag

30 Amino acid sequence:

GSSQVQLKESGPGLVAPSQSL SITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIW
GDGSTDYNSALKSRLSISKDNSKSQVFLKMDSLQTDDTARYYCARDHYGTHYAM
DYWGQGTSTVTVSSDQ

35 57. FC2-2scFv

Nucleotide sequence:

gttgtaagcttgccgccatggattcacagggcagggttctatgttactgctgctatgggtatctggtacctgtggggacattgtgatg
tcacagtctccatcctcctagctgtgtcagttggagagaagggttctatgagctgcaagtccagtcagagccctttatataatcacaat
caaaagaactacttggcctggtaccagcagataaccagggcagttctcctaaactgctgatttactgggcacccactaggggaatctgg
40 ggtccctgatcgcttcacaggcagtggtatctgggacagatttactctcaccatcagcagagtgaaggctgaagacctggcagttta
ttactgtcagcaatattatactatcctccacgttcggagggtggcaccagctggaaataaaagggtggcgggtggtcgggcgggtg
gtgggtcgggtggcggcgggagctctcaggtgcagttgaaggagtcaggacctggcctggtggcgcctcacagagcctgtcc
atcacatgcaccgtctcagggttctcattaaccgtctatggtgtaactgggttcgccagcctccaggaaagggtctggactggctgg
gaatgatatgggtgatggaagcacagactataattcagctctcaatccagactgagcatcagtaaggacaactccaagacca
45 gttttcttaaaatggacagctctacaaactgatgacacagccaggtactactgtgccagagatcactatggtaccactatgctatgg
actactggggtaaggaacctcagtcaccgtctcctctgatcag

Amino acid sequence:

MDSQAQVLMMLLLWVSGTCGDIVMSQSPSSLA VSVGEKVSMSCKSSQSLLYNHN
50 QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDRFTGSGSGTDFTLTISR VKAEDLA
VYYCQQYYTYPPTFGGG TKLEIKGGGSGGGGSGGGGSSQVQLKESGPGLVAPSQ

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SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMWGDGSTDYNSALKSRLSISK
DNSKSQVFLKMDSLQTTDDTARYYCARDHYGTHYAMDYWGQGTSVTVSSDQ

58. FC2-2 VHL11S

5 Nucleotide sequence:
gggagctctcaggtgcagttgaaggagtcaggacctggctcggcggccctcacagagcctgtccatcacatgcaccgtctcag
gggtctcattaaccgtctatgggttaactgggttcgccagcctccaggaaagggtctggactggggaatgatatggggtgatg
gaagcacagactataaattcagctctcaaatccagactgagcatcagtaaggacaactccaagagccaagtttctaaaaatggaca
gtctacaaactgatgacacagccaggtactactgtgccagagatcactatgggtaccactatgctatggactactggggtcaaggaa
10 cctcagtcaccgtctcctctgatcag

Amino acid sequence:
(GSS)QVQLKESGPGSVAPSQSLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGM
WGDGSTDYNSALKSRLSISKDNSKSQVFLKMDSLQTTDDTARYYCARDHYGTHYA
15 MDYWGQGTSVTVSSDQ

59. FC2-2 VH L11S scFv

Nucleotide sequence:
gttgtaagcttgcggccatggattcacaggcccaggttctatgttactgctgctatgggtatctggtacctgtggggacattgtgatg
20 tcacagctctccatcctcctagctgtgtcagttggagagaagggttctatgagctgcaagtcagtcagagcctttatataatcacaat
caaaagaactacttggcctgtgaccagcagataccagggcagctctcctaaactgctgatttactgggcatccactagggaatctgg
ggtcctgatcgttcacaggcagtgatctgggacagatttactctcaccatcagcagagtgaaggctgaagacctggcagttta
ttactgtcagcaatattatacctatcctcccagcttcggaggtggcaccagctggaaataaaagggtggcggtggtcggcggtg
25 gtgggtcgggtggcggggagctctcaggtgcagttgaaggagtcaggacctggctcgggtggcgccctcacagagcctgtcc
atcacatgcaccgtctcaggttctcattaaccgtctatgggttaactgggttcgccagcctccaggaaagggtctggactggctgg
gaatgatatggggtgatggaagcacagactataaattcagctctcaaatccagactgagcatcagtaaggacaactccaagagccaa
gttttctaaaaatggacagctctacaaactgatgacacagccaggtactactgtgccagagatcactatgggtaccactatgctatgg
actactgggggtcaaggaaacctcagtcaccgtctcctctgatcag

30 Amino acid sequence:
MDSQAQVLMMLLLWVSGTCGDIVMSQSPSSLA VSVGEKVSMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDRFTGSGSGTDFTLTISR VKAEDLA
VYYCQQYYTYPPTFGGGTKLEIKGGGGSGGGGSGGGGSSQVQLKESGPGSVAPSQ
SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMWGDGSTDYNSALKSRLSISK
35 DNSKSQVFLKMDSLQTTDDTARYYCARDHYGTHYAMDYWGQGTSVTVSSDQ

60. FC2-2 (SSS-S)H WCH2 WCH3

Nucleotide sequence:
gttgtaagcttgcggccatggattcacaggcccaggttctatgttactgctgctatgggtatctggtacctgtggggacattgtgatg
40 tcacagctctccatcctcctagctgtgtcagttggagagaagggttctatgagctgcaagtcagtcagagcctttatataatcacaat
caaaagaactacttggcctgtgaccagcagataccagggcagctctcctaaactgctgatttactgggcatccactagggaatctgg
ggtcctgatcgttcacaggcagtgatctgggacagatttactctcaccatcagcagagtgaaggctgaagacctggcagttta
ttactgtcagcaatattatacctatcctcccagcttcggaggtggcaccagctggaaataaaagggtggcggtggtcggcggtg
45 gtgggtcgggtggcggggagctctcaggtgcagttgaaggagtcaggacctggcctgggtggcgccctcacagagcctgtcc
atcacatgcaccgtctcaggttctcattaaccgtctatgggttaactgggttcgccagcctccaggaaagggtctggactggctgg
gaatgatatggggtgatggaagcacagactataaattcagctctcaaatccagactgagcatcagtaaggacaactccaagagccaa
gttttctaaaaatggacagctctacaaactgatgacacagccaggtactactgtgccagagatcactatgggtaccactatgctatgg
actactgggggtcaaggaaacctcagtcaccgtctcctctgatcaggagcccaaatcttctgacaaaactcacacatccccaccgtcct
cagcacctgaactcctgggtggaccgtcagcttctcttccccccaaaacccaaggacacctcatgatctccggacctctgag
50 gtcacatgcgtgggtgggtgacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataat
gccaaagacaagccgcgggaggagcagtaacacagcagtcaccgtgtgtgtcagcgtcctcaccgtctgcaccaggactggct

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gaatggcaaggagtacaagtgaaggtctccaacaagccctcccagccccatcgagaaaaccatctccaagccaaagggc
agccccgagaaccacaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgctgtgca
aaggcttctatccaagcgacatcgccgtggagtgaggagcaatggcgagccggagaacaactacaagaccacgctcccggtg
ctggactccgacggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctc
5 cgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

Amino acid sequence:

MDSQAQVLMLLLLWVSGTCGDIVMSQSPSSLA VSVGEKVSMSCKSSQSLLYNHN
QKNYLA WYQQIPGQSPKLLIY WASTRESGVPDRFTGSGSGTDFLTISR VKAEDLA
10 VYYCQQYYTYPPTFGGGTKLEIKGGGSGGGGSGGGGSSQVQLKESGPGLVAPSQ
SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIWGDGSTDYNSALKSRLSISK
DNSKSQVFLKMDSLQTD D TARYYCARDHYGTHYAMDYWGQGTSVTVSSDQEPK
SSDKTHTSPSSAPELLGGPSVFLFPPKPKDTLMISRTP EVTCVVVDVSHEDPEVKF
NWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKA
15 LPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESN
GQPENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ
KSLSLSPGK

61. FC2-2 VHL11S (SSS-S)H WCH2 WCH3

20 Nucleotide sequence:

gttgtaagcttgcgccatggattcacaggccaggttctatgttactgctgctatgggtatctggtacctgtggggacattgtgatg
tcacagtctccatcctcctagctgtgtcagttggagagaaggtttctatgagctgcaagtcagtcagagcctttatataatcacat
caaaagaactacttgccctggtaccagcagataccagggcagctctctaaactgctgatttactgggcatccactagggaatctgg
ggtccctgatcgcttcacaggcagtgatctgggacagattcactctcaccatcagcagagtgaaggctgaagacctggcagttta
25 ttactgtcagcaataattatctatcctccacgttcggaggtggcaccaagctggaataaaagggtggcgggtggctcggcggtg
gtgggtcgggtggcggggagctctcaggtgcagtggaaggagtcaggacctggctcgggtggcgccctcacagagcctgtcc
atcacatgcaccgtctcagggttctcattaaccgtctatggtgtaactgggttcgccagcctccaggaaagggtctggactggctgg
gaatgatattgggtgatggaagcacagactataaattcagctctcaaatccagactgagcatcagtaaggacaactccaagagccaa
gtttcttaaaatggacagctacaaactgatgacacagccaggtactactgtgccagagatcactatggtaccactatgctatgg
30 actactggggtaaggaacctcagtcaccgtctcctctgatcaggagcccaaatcttctgacaaaactcacacatccccaccgtcct
cagcacctgaactcctgggtggaccgtcagctctcctctcccccaaaacccaaggacacctcatgatctcccgaccctgag
gtcatatcggtggtggacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataat
gccaaagacaaagccgcgggagagcagtaacagacgtaccgtgtgtcagcgtcctcaccgtcctgcaccaggactgggt
gaatggcaaggagtacaagtgaaggtctccaacaagccctcccagccccatcgagaaaaccatctccaagccaaagggc
35 agccccgagaaccacaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgacctgctgca
aaggcttctatccaagcgacatcgccgtggagtgaggagcaatgggcagccggagaacaactacaagaccacgctcccggtg
ctggactccgacggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctc
cgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctccctgtctccgggtaaatgatctaga

40 Amino acid sequence:

MDSQAQVLMLLLLWVSGTCGDIVMSQSPSSLA VSVGEKVSMSCKSSQSLLYNHN
QKNYLA WYQQIPGQSPKLLIY WASTRESGVPDRFTGSGSGTDFLTISR VKAEDLA
45 VYYCQQYYTYPPTFGGGTKLEIKGGGSGGGGSGGGGSSQVQLKESGPGSVAPSQ
SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIWGDGSTDYNSALKSRLSISK
DNSKSQVFLKMDSLQTD D TARYYCARDHYGTHYAMDYWGQGTSVTVSSDQEPK
SSDKTHTSPSSAPELLGGPSVFLFPPKPKDTLMISRTP EVTCVVVDVSHEDPEVKF
NWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKA
LPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESN
GQPENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ
50 KSLSLSPGK

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62. UCHL-1 VH

Nucleotide sequence:

atgggcaggcttacttctcattctgctactgattgttctgcataatgtcctctcccagattactctgaaagagcttgccctgggactct
gcagccctcccagaccctcagctgactgttcttctctgggttttactgaccattatggtataggagtaggttgattcgtcagcct
5 ccagggaagggtctggagtggtgacacacatttggtggaatgataataagtactataacacagccctgaggagccggctcaca
tctcaaggattcctccaacaaccaagtactcctcaagatgccaatgtggacactgcagataccgccacatactactgtctctacg
gctacacttactggggccaaggactctggctactgtctctgca

Amino acid sequence:

10 MGRLTSSFLLIVPAYVLSQITLKESGPGILQPSQTLSTCSFSGFSLTTYGIGVGWIR
QPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNNQVLLKIANVDTADTAT
YYCLYGYTYWGQGLTVSA

63. UCHL-1 VL

Nucleotide sequence:

atgaattgacctgtaggctgttggtgctgatgttctggattcctgcttccatcagtgatgttgatgacccaaactccactctccctgc
ctgtcagctctggagatcaggccctccatctcttcgagatctagtcagagccttcttacagtaatggaacacattttacattggtacct
gcagaagccaggccagctccaaaactcctgatctacaaactttcaaccgattttctgggggtcccagacaggttcagtggtgagtg
20 atcaggagacagattcacactcaagatcagcagagtgaggctgaggatctgggagttatttctgctctcaaagtacacatgttccg
tggacgttcggtggaggcaccagctggaatcaaa

Amino acid sequence:

25 MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLQKPGQSPKLLIYKLSNRFSGVDPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTKLEIK

64. UCHL-1 scFv

Nucleotide sequence:

gttgtaagcttgccgcatgaagtgcctgtaggctgttggtgctgatgttctggattcctgcttccatcagtgatgttgatgaccc
30 aaactccactctccctgcctgtcagctctggagatcaggccctccatctctgcagatctagtcagagccttcttacagtaatgaaac
acctatttaccattggtacctgcagaagccaggccagctcctccaaaactcctgatctacaaactttcaaccgattttctgggggtcccaga
caggttcagtggtgagtgatcaggagacagattcacactcaagatcagcagagtgaggctgaggatctgggagttatttctgctc
tcaaagtacacatgttccgtggacgttcggtggaggcaccagctggaatcaagatggcgtggctcggcggtggtggtgatct
ggaggaggtgggagctctcagattactctgaagagcttgccctgggattctgcagccctcccagaccctcagctgactgttctt
35 tctctgggttttactgaccattatggtataggagtaggttgattcgtcagcctccagggaagggtctggagtggtgacacacat
tgggtggaatgataataagtactataacacagccctgaggagccggctcacaatcctcaagattcctccaacaaccaagtactcct
caagatgccaatgtggacactgcagataccgccacatactactgtctctacggctacacttactggggccaagggactctggtca
ctgtctctgctgatca

40 Amino acid sequence:

MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLQKPGQSPKLLIYKLSNRFSGVDPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTKLEIKDGGGSGGGGSGGGGSSQITLKESGPGILQPSQTLSTCS
FSGFSLTTYGIGVGWIRQPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNN
45 QVLLKIANVDTADTATYYCLYGYTYWGQGLTVTSAD

65. UCHL-1 VH I11SL12S

Nucleotide sequence:

50 gggagctctcagattactctgaaagagcttgccctgggactctgcagccctcccagaccctcagctgactgttcttctctgggtt
tactgaccacttatggtataggagtaggttgattcgtcagcctccagggaagggtctggagtggtgacacacatttggtggaat

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gataataagtaactataacacagccctgaggagccggctcacaatctccaaggattcctccaacaaccaagtaactcctcaagatcgc
caatgtggacactgcagataccgccacatactactgtctctacggctacacttactggggccaagggactctggtcactgtctctgct
gatca

5 Amino acid sequence:
(GSS)QITLKESGPGSSQPSQTLSTCSFSGFSLTTYGIGVGWIRQPPGKGLEWLTHIW
WNDNKYYNTALRSRLTISKDSSNNQVLLKIANVDTADTATYYCLYGYTYWGQGT
LVTVSAD

10

66. UCHL-1 scFv VH L11S

Nucleotide sequence:

gttgtaagcttcccgcctgaagttgcctgttaggctgttggtgctgatgttctggattcctgctccatcagtgatgttgatgaccc
aaactccactctccctgcctgtcagcttggagatcaggcctccatcttgcagatctagtcagagcctctttacagtaatgaaac
15 acctattacattggtacctgcagaagccaggccagctctccaaactcctgatctacaaactttccaaccgattttctggggtcccaga
cagggtcagtggtgagtcagggacagatttcacactcaagatcagcagagtgaggctgaggatctgggagtttattctgctc
tcaaagtacacatgttccgtggacgttcggtggaggccaccaagctggaaatcaaagatggcgggtggctcgggcgggtggtgatct
ggaggaggtgggagctctcagattactctgaaagagcttgccctgggagctccagccctcccagaccctcagctgactgttct
ttctctgggttttactgaccacttatggtataggagtaggttggttcgctcagcctccagggaagggtctggagtggctgacacac
20 atttggtggaatgataataagtaactataacacagccctgaggagccggctcacaatctccaaggattcctccaacaaccaagtaactc
ctcaagatcgccaatgtggacactgcagataccgccacatactactgtctctacggctacacttactggggccaagggactctggtc
actgtctctgctgatca

Amino acid sequence:

25 MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLQKPGQSPKLLIYKLSNRFSGVSPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTKLEIKDGGGSGGGGSGGGGSSQITLKESGPGSSQPSQTLSTC
SFSGFSLTYYGIGVGWIRQPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGTTLVTVSAD

30

67. UCHL-1 scFv (SSS-S)H WCH2 WCH3

Nucleotide sequence:

gttgtaagcttcccgcctgaagttgcctgttaggctgttggtgctgatgttctggattcctgctccatcagtgatgttgatgaccc
35 aaactccactctccctgcctgtcagcttggagatcaggcctccatcttgcagatctagtcagagcctctttacagtaatgaaac
acctattacattggtacctgcagaagccaggccagctctccaaactcctgatctacaaactttccaaccgattttctggggtcccaga
cagggtcagtggtgagtcagggacagatttcacactcaagatcagcagagtgaggctgaggatctgggagtttattctgctc
tcaaagtacacatgttccgtggacgttcggtggaggccaccaagctggaaatcaaagatggcgggtggctcgggcgggtggtgatct
ggaggaggtgggagctctcagattactctgaaagagcttgccctgggagcttgcagccctcccagaccctcagctgactgttctt
40 tctctgggttttactgaccacttatggtataggagtaggttggttcgctcagcctccagggaagggtctggagtggctgacacacat
ttggtggaatgataataagtaactataacacagccctgaggagccggctcacaatctccaaggattcctccaacaaccaagtaactcct
caagatcgccaatgtggacactgcagataccgccacatactactgtctctacggctacacttactggggccaagggactctggtca
ctgtctctgctgatcaggagcccaatcttctgacaaaactcacacatcccaccgtcctcagcacctgaactcctgggtggaccgt
cagttctctcttcccccaaaacccaaggacaccctcatgatctccggaccctgaggtcacatgcgtgggtgggtggacgtgagc
45 cacgaagaccctgaggtcaagttcaactgtgactggacggcgtggaggtgcataatgccaaagacaaagccgcgggaggagca
gtacaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccagactggctgaatggcaaggagtacaagtgcaaggtc
tccaacaagccctcccagccccatcgagaaaaccatctcaaagccaaaggcagccccgagaaccacaggtgtacacct
gccccatcccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcaaaggctctatccaagcgacatcgccgtg
gagtgaggagagcaatgggcagccggagacaactacaagaccacgcctcccgctggtgactccgacggtccttctctctac
50 agcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctcctgctgatgaggtctgcacaaccact
acacgcagaagagcctctccctgtctccgggtaaatgatctaga

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PCT/US2003/041600

Amino acid sequence:

MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLYQKPGQSPKLLIYKLSNRFSGVSPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
5 QSTHVPWTFGGGTKLEIKDGGGSGGGGSGGGGSSQITLKESGPGILQPSQTLSTLCS
FSGFSLTTYGIGVGWIRQPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGLTVTVSADQEPKSSDKTHTSPSSAP
ELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNA
KTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQ
10 PREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVL
DSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

68. UCHL-1 scFv VHL11S (SSS-S)H WCH2 WCH3

Nucleotide sequence:

gttgtaagcttcccgcctgaagtgccctgtaggctgttggtgctgatgttctggattcctgctccatcagtgatgttgatgaccc
aaactccactctccctgctgctgagcttgagatcaggcctccatctctgcagatctagtcagagcctctttacagtaaatgaaac
acattattacattggtacctgcagaagccaggccagctcctcaaaactcctgctacaaactttcaaccgattttctggggtcccaga
cagggtcagtggtgagtgatcaggacagatttcacactcaagatcagcagagtgagggtgaggtatctgggagttatttctgctc
20 tcaagtacacatgttccgtggacgttcggtggagggacccaagctggaatcaaatgagcgggtggtcggcggtggtggtgatc
ggaggaggtgggagctctcagattactctgaaagagctctggcctgggagctcccagccctcccagaccctcagctgactgttc
ttctctgggttttactgaccacttatggtataggagtaggttggtcgtcagcctccagggaagggtctggagtggtgacacac
atttggtggaatgataataagtactataacacagccctgaggagccggctcacaatctcaaggattcctccaacaaccaagtac
ctcaagatcgccaatgtggacactgcagataccgccacatactactgtctacggctacacttactggggccaagggactctggtc
25 actgtctctgctgatcaggagcccaaatcttctgacaaaactcacacatccccaccgtcctcagcacctgaactcctgggtggaccg
tcagtcttctcttcccccaaaacccaaggacaccctcatgatctccggaccctgagggtacatgctggtggtggtgacgtgag
ccacgaagaccctgagggtcaagttcaactggtacgtggagcggctggaggtgcataatgccagacaaagccgcgggaggagc
agtacaacagcagctaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaaggagtacaagtgaaggt
ctccaacaagccctcccagccccatcgagaaaacatctccaaagccaaaggcagccccgagaaccacaggtgtacaccc
30 tgcctccatcccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcaaaggcttctatccaagcagatcgccgt
ggagtgaggagcaatgggcagccggagacaactacaagaccagcctcccgtgctgactccgacggctccttctctctta
cagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctccgtgatgcatgaggtctgcacaacca
ctacacgcagaagacgtctcctgtctccgggtaaatgatctagaa

Amino acid sequence:

MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLYQKPGQSPKLLIYKLSNRFSGVSPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTKLEIKDGGGSGGGGSGGGGSSQITLKESGPGSSQPSQTLSTLCS
SFSGFSLTTYGIGVGWIRQPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNN
40 QVLLKIANVDTADTATYYCLYGYTYWGQGLTVTVSADQEPKSSDKTHTSPSSAP
ELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNA
KTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQ
PREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVL
DSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

45

69. 5B9 VH L11S

Nucleotide sequence:

gggagctctcaggtgcagctgaagcagtcaggacctggctcagtcagtcctcagagacctgtccatcacctgcacagtctctg
gtttctattaactacatgctgtacactgggttcgagctctcaggaaagggtctggagtggtgggagtgatgagtggtgg
50 aatcacagactataatgcagcttcatatccagactgagcatcaccaaggacattccaagagccaagtttcttaaaatgaacagtc

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PCT/US2003/041600

tgcaacctaataacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatggactactgggggtcaa
ggaacctcagtcaccgtctcctcag

Amino acid sequence:

5 (GSS)QVQLKQSGPGSVQSSQSLSTCTVSGFSLTTYAVHWVRQSPGKGLEWLGVI
WSGGITDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDAIYYCARNGGDNYPPY
YAMDYWGQGTSTVTVSS

10 73. 5B9 VH L11S scFv

Nucleotide sequence:

aagcttcccgcacagaggttctctgctcagcttctgggggtgcttctgctctggatccctggatccactgcagatattgtgatgacgca
ggctgcattctccaatccagtcactcttgaacatcagcttccatctcctgcaggtctagtaagagctcctacatagtaatggcatca
cttatttatttggatctgcagaagccaggccagctctcctcagctcctgatttatcagatgtccaacctggcctcaggagtcacagaca
15 gggtcagtagcagtggtcaggaactgatttcacactgagaatcagcagagtgagggtgaggatgtgggtgtttattactgtgctc
aaaatctagaacttccgctcagcttctgggtgctgggaccaagctggagctgaaacgggggtggcgggtggctcgggcgggtgggt
cgggtggcggcgggagctctcaggtgcagctgaagcagtcaggacctggctcagtcagtcctcacagagcctgtccatcacct
gcacagctctctggttctcattaactacatgctgtacactgggttcgccagctcctcaggaaagggtctggagtggctgggagtgat
atggagtgggtgaatcacagactataatgcagcttccatccagactgagcatcaccaaggacgattccaagagccaagtttctt
20 aaaatgaacagcttgcacctaataacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatgga
ctactggggtaaggaacctcagtcaccgtctcctcag

Amino acid sequence:

MRFSAQLLGLLVLPWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHSNGITY
25 LYWYLQKPGQSPQLLIYQMSNLSAGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGSGGGGSGGGGSSQVQLKQSGPGSVQSSQSLSI
TCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSGGITDYNAAFISRLSITKDDSKS
QVFFKMNSLQPNDAIYYCARNGGDNYPPYYAMDYWGQGTSTVTVSS

30

70. 5B9 scFv VHL11S (SSS-S)H WCH2 WCH3

Nucleotide sequence:

aagcttcccgcacagaggttctctgctcagcttctgggggtgcttctgctctggatccctggatccactgcagatattgtgatgacgca
ggctgcattctccaatccagtcactcttgaacatcagcttccatctcctgcaggtctagtaagagctcctacatagtaatggcatca
35 cttatttatttggatctgcagaagccaggccagctctcctcagctcctgatttatcagatgtccaacctggcctcaggagtcacagaca
gggtcagtagcagtggtcaggaactgatttcacactgagaatcagcagagtgagggtgaggatgtgggtgtttattactgtgctc
aaaatctagaacttccgctcagcttctgggtgctgggaccaagctggagctgaaacgggggtggcgggtggctcgggcgggtgggt
cgggtggcggcgggagctctcaggtgcagctgaagcagtcaggacctggctcagtcagtcctcacagagcctgtccatcacct
gcacagctctctggttctcattaactacatgctgtacactgggttcgccagctcctcaggaaagggtctggagtggctgggagtgat
40 atggagtgggtgaatcacagactataatgcagcttccatccagactgagcatcaccaaggacgattccaagagccaagtttctt
aaaatgaacagcttgcacctaataacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatgga
ctactggggtaaggaacctcagtcaccgtctcctctgacaggagcccaatctctgacaaaactcacatccccaccgtctc
agcactgaactcctgggtggaccgtcagcttctcttcccccaaaacccaaggacacctcatgatctccggacctgagg
tcacatgcgtgggtggagctgagccacgaagacctgaggtcaagtcaactggtacgtggacggcgtggaggtgcataatgc
45 caagacaaagccgggaggagcagtagcaacagcagctaccgtgtgtgcagcgtcctcaccgtcctgcaccaggactggctga
atggcaaggagtacaagtgaaggtctccaacaagccctccagccccatcgagaaaaccatctccaagccaaggagcag
ccccgagaaccacaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagctgacctgctgggtcaaa
ggcttctatccaagcagatcgcctggagtgggagagcaatgggacgcccggagaaactacaagaccacgctccctgct
ggactccgagggctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcagggaacgtcttctatgctcc
50 gtgatgcatgaggctctgcacaacctacacgcagaagacgtctcctctgctccgggtaaatgatctagag

WO 2005/017148

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Amino acid sequence:

MRFSAQLLGLLVLPWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHNSGITY
LYWYLQKPGQSPQLLIYQMSNLAGVPDFRSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGGSGGGSSQVQLKQSGPGSVQSSQSLSI
5 TCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSGGITDYNAAFISRLSITKDDSKS
QVFFKMNSLQPNDAIYYCARNGGDNYPIYYAMDYWGQGTSTVTVSSDQEPKSS
DKTHTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPPEVTCVVVDVSHEDPEVKFNW
YVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP
10 ENNYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLS
LSPGK

15 **76. 2H7 scFv VH L11S (SSS-S)H P238SCH2 WCH3**

Nucleotide sequence:

aagcttgcgccatggatttcaagtgcagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagcttccagcaatcctgtctgcatctccaggggagaaggcacaatgacttgcagggccagctcaagtgttaagtacatgcact
ggtaccagcagaagccaggtatctccccaaacctggattatgcccatccaacctggcttctggagtcctgtctgcttcagtg
20 gcagtgggtctgggaccttactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgaggtt
taaccacccacgttcggtgctgggaccaagctggagctgaagatggcggctggcggctgggctggatctggagggagtg
ggagctctcaggttatctacagcagctggggtgagtggtgagggcctggggcctcagtgagatgctctgcaaggcttctggc
tacacattaccagttacaatatgcactgggtaagcagacacctagacaggcctggaatggattggagctattatccaggaaat
gggtatacttctcacaatcagaagttcaagggaaggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
25 cagcctgacatctgaagactctgcggtctatttctgtgaagagtggtgtactatagtaacttactggtacttcatgctctggggcac
agggaccacggtcaccgtctctctgatcaggagcccaaatctctgacaaaactacacatccccaccgtctcagcaccgtgaact
cctggggggatcgtcagcttctctctcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtgg
tggtggacgtgagccacgaagacctgaggicaagtccaactggtacgtggacggcgtggaggtgcataatgccaagacaaagc
cgcgaggaggagcagtacaacagcacgtaccgtgtggtcagcgtctcaccgtctgcaccaggactgggtgaatggcaaggag
30 tacaagtgaaggtctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaagggcagccccgagaacc
acaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgctggtcaaggttctatccc
agcgacatcgccgtggagtgaggagagcaatgggcagccggagaaactacaagaccacgctccgtgctggactccgacg
gctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctcctgatgcatgag
gctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga
35

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILASPGKEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLAGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
40 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSYWFYFDVWGTTTVTVSSDQEPKSSDK
THTSPSSAPELLGGSSVFLFPPKPKDTLMISRTPPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
45 NYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
PGK

78. 2H7 scFv VH L11S (SSS-S)H WCH2 WCH3

Nucleotide sequence:

50 aagcttgcgccatggatttcaagtgcagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagcttccagcaatcctgtctgcatctccaggggagaaggcacaatgacttgcagggccagctcaagtgttaagtacatgcact

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PCT/US2003/041600

ggtaccagcagaagccaggatcctccccc aaacctggattatgccccatccaacctggcttctggagtcctgctcgttcagtg
gcagtgggtctgggacctcttactctctcacaatcagcagagtggaggctgaagatgctgccacttattactgccagcagtggagttt
taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcggtggctcggcggtgggtgatctggaggaggtg
ggagctctcaggcttactacagcagctcgggctgagtcggtgaggcctggggcctcagtgaaatgctcgaaggcttctggc
5 tacacatttaccagttacaatatgcactgggtaagcagacacctagacaggcctggaatggattggagctattatccaggaaat
ggtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctattctgtgcaagagtgggtgactatagtaactcttactggtacttcgatgctcggggcac
agggaccacggtcaccgtctctctgatcaggagcccaaatctctgacaaaactcacatccccaccgtcctcagcacctgaact
cctggggggaccgtcagttctctctcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtgg
10 tgggtggacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgccaagacaaaagc
cgcgaggaggagcagtacaacagcagctaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaaggag
tacaagtgaaggtctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
acaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgctgctcaaaggcttctatccc
agcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgctcccggtgctggactccgacg
15 gctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgatgag
gctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
20 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
THTSPSSAPPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
25 DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
PGK

30

79. 2H7 scFv VH L11S (CSS-S)H WCH2 WCH3

Nucleotide sequence:

aagcttgcgccatggatttcaagtgcagatttcagcttctgtaatacagtgcttcagtcataattgccagaggacaaattgttctct
cccagctctcagcaatcctgtctgcactcaggggagaaggtcacaatgacttcagggccagctcaagtgttaattacatgcact
35 ggtaccagcagaagccaggatcctccccc aaacctggattatgccccatccaacctggcttctggagtcctgctcgttcagtg
gcagtgggtctgggacctcttactctctcacaatcagcagagtggaggctgaagatgctgccacttattactgccagcagtggagttt
taaccacccacgttcggtgctgggaccaagctggagctgaaagatggcggtggctcggcggtgggtgatctggaggaggtg
ggagctctcaggcttactacagcagctcgggctgagtcggtgaggcctggggcctcagtgaaatgctcgaaggcttctggc
tacacatttaccagttacaatatgcactgggtaagcagacacctagacaggcctggaatggattggagctattatccaggaaat
40 ggtgatacttctacaatcagaagttcaagggaaggccacactgactgtagacaaatcctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggtctattctgtgcaagagtgggtgactatagtaactcttactggtacttcgatgctcggggcac
agggaccacggtcaccgtctctctgatcaggagcccaaatcttctgacaaaactcacatccccaccgtcctcagcacctgaact
cctggggggaccgtcagttctctctcccccaaaacccaaggacacctcatgatctccggaccctgaggtcacatgcgtgg
tggtggacgtgagccacgaagacctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgccaagacaaaagc
45 cgcgaggaggagcagtacaacagcagctaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaaggag
tacaagtgaaggtctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
acaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtcagcctgacctgctgctcaaaggcttctatccc
agcgacatcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgctcccggtgctggactccgacg
gctccttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctccgtgatgatgag
50 gctctgcacaaccactacacgcagaagagcctctcctgtctccgggtaaatgatctaga